H.G. Geyer

Report of Proceedings

Southern Regional

LIVESTOCK SPECIALISTS' CONFERENCE

November 11-15, 1968

Texas A&M University, College Station, Texas

United States Department of Agriculture

Federal Extension Service

SOUTHERN REGIONAL LIVESTOCK SPECIALISTS' CONFERENCE

Texas A&M University
November 11-15, 1968

TABLE OF CONTENTS

Table of Contents Continued

NATIONAL STUDY OF THE COOPERATIVE EXTENSION SERVICE 1/

In January 1966, the Extension Committee on Organization and Policy (ECOP) asked the Executive Committee of its parent body, the National Association of State Universities and Land-Grant Colleges, to support a national study of the Cooperative Extension Service by the Association and the U. S. Department of Agriculture. The study was requested by State Extension Directors in an effort to obtain a top-level analysis of Extension's present posture and the role it might be expected to perform in the decade ahead.

Approval of ECOP's request by the Executive Committee of NASULGC was followed by an affirmative response by the Secretary of Agriculture. In the Secretary's Memorandum No. 1601, dated October 5, 1966, the purposes of the study were indicated as follows:

- To analyze and evaluate past contributions of the Cooperative Extension Service and assess its present posture.
- To review basic administrative and operational relationships between the Department of Agriculture and the respective Land-Grant Universities for the purpose of building a stronger program based on mutual understanding and direction.
- To examine the functions exercised by the Cooperative Extension Service in relationship to other Extension and Extension-related programs of various executive departments of the Federal Government.
- To project the future scope, direction and redirection of the Cooperative Extension Service in order that it may make the maximum contribution to local, state, and national goals and needs of the people it serves.

The Association appointed six representatives to the Committee established to make the study. Six USDA officials were appointed by the Secretary of Agriculture. Three representatives of the public were appointed by joint action of the Association and the Department. The Association representatives included three University Presidents (one of a nonland-grant university), a Provost for Agriculture (Dr. E. T. York of the University of Florida), and two Extension Directors (Brice Ratchford of Missouri and Lowall Watts of Colorado). The USDA representatives included an Assistant Secretary of Agriculture, agency heads, and other high officials of the Department.

Cochairmen of the Joint Study Committee were Dr. W. Robert Parks, President of Iowa State University and representative of the Land-Grant Association, and Dr. George L. Mehren, Assistant Secretary of Agriculture and representative of the USDA. Dr. Mehren resigned from his USDA post several months ago. As a result, Secretary Freeman named Dr. Ned D. Bayley, Director of Science and Education of the Department, to succeed Dr. Mehren as Cochairman.

1/ Presented by Daniel C. Pfannstiel, Agricultural Extension Service, Texas A&M University, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

Those of you who have been in Extension for some time may recall that several national studies of the Cooperative Extension Service have been made previously.

Nine years ago, there was a study made which came to be known as the Scope Report. It projected the role and scope of the Cooperative Extension Service for the future. Nine broad areas of program emphasis were identified. Contrary to the present study, the Scope Report was strictly an "in house" or internal study. That study, sponsored by ECOP, had considerable impact in broadening the concept of Extension educational programs. The notion of scope, that is, the parameters of the areas within which we should be working, is just one of several concerns of the present study which has just been completed.

More like the current study was the 1948 Joint Committee Report On Extension Programs, Policies, and Goals. That study has come to be known as the "Kepner Report." It, like the present undertaking, was an external study also jointly made by the USDA and the Land-Grant Association. In addition to program scope, it dealt with federal-state relationships, financing, legislation, methods of work - much as the present study does.

Another factor which stimulated the making of this study at this time was the recently completed Joint USDA-NASU&LG Study of the Agricultural Research sector. This joint federal-state study projected for the next decade the key needs in research and undertook to array the priorities of research needs during this period. In its report entitled "A National Program of Research for Agriculture" are enumerated goals for agricultural research and some comprehensive recommendations, including one which advocates closer collaboration between research and Extension.

The present study of Extension took some eighteen months to complete. The pattern of operation was for the Committee to meet about quarterly for a couple of days to set broad directions and to make major decisions. Serving as a staff arm of the main Committee was the Staff Task Force composed of six staff members from the Federal Extension Service (who were assigned full time to study) and six members from State Extension Services (who were expected to devote about one-fourth time to the study). I might add that appropriately, from a Southern Region viewpoint at least, was the fact that three of the six-state members on the Task Force were from the Southern Region: Dr. Glenn Andrews, District Director from North Carolina, Mrs. Mary Jim Coleman, Assistant Director for Women's Work from Alabama, and I.

The Staff Task Force, during the 18-month period of the study, met one week each month. It frequently met on the campus of one of the Land-Grant Universities, which gave the members a chance to visit with University and Extension officials. The Task Force conducted numerous special studies and carried out a number of other data gathering assignments. Its data collection was focused largely on: (1) "What is the Cooperative Extension Service doing? (2) What should it be doing?"

A detailed relationships survey was made in 16 different states, which involved personally conducted interviews with the Land-Grant University Presidents, Vice Presidents, Deans, Directors, Department Heads, Specialists, District Agents, and County Extension Agents. Four states in each region were involved. In the South, these were Oklahoma, Alabama, Georgia, and South Carolina. Also, interviews were conducted in the USDA which involved the Secretary of Agriculture,

Under Secretary, Assistant Secretaries, and most of the personnel of the Federal Extension Service.

Most - if not all - Extension Staff members in the United States were involved in the study. You may recall being asked to indicate on a questionnaire the relative emphasis that you felt should be given to broad areas of Extension concern. A similar-type questionnaire was distributed among key leaders, members of Extension planning committees, government officials, and others in an effort to determine what selected publics felt Extension should be doing in the future. While the responses did not represent a scientific sample, they did provide the Committee some exceedingly useful information. Surprisingly - or maybe not so surprisingly - several of our publics appeared to be more disposed to our moving beyond traditional areas of work than we ourselves were.

In its report, which is being formally released this week during the Annual Meeting of the NASULGC, the Committee recognizes that the Cooperative Extension Service has been a dominant force in rural America for more than half a century. It notes that the changing environment of the urban and rural sections of the United States has resulted in a need to modify the major program thrusts of Cooperative Extension.

The report briefly reviews our national heritage and the devolution of our public agencies and institutions, outlines current national goals, and examines the problem of Americans isolated from the mainstream of society. It also reviews the basic problems of our times.

Against the backdrop of historical evolution and the changes in our society, the report analyzes the present activities of the Cooperative Extension Service, then develops the Joint Committee's recommendations for the future. These are based upon the public needs as seen by the Committee and upon the capabilities of Cooperative Extension to serve those needs, also as these were seen by the Committee.

What, then, are some of the basic recommendations that the Committee has made? Overall, the Committee is issuing a call for the Cooperative Extension Service to adapt its staff and program effort to serve more adequately the broad range of social and economic problems of the Nation, while continuing its assistance to the agricultural sector of the economy.

The Committee recognizes the Cooperative Extension Service as an institution capable of significant participation in national efforts of an affirmative nature, providing it has the resources and the willingness to move aggressively into the arena of social and economic development on both a group and an individual basis.

The Committee is recommending major expansion of activity in programs designed to enhance the quality of living of individuals.

The Committee was concerned with what it felt has been a proliferation and diffusion of the educational function among other agencies and units of the USDA. The Committee is calling on the USDA and the Land-Grant Universities to cast the local Cooperative Extension Service Office in the role of the primary source of information and the focal referral point for the many programs involving direct relationships between units of government and the people, especially in rural areas.

The Committee felt quite strongly that the Cooperative Extension Service should in fact be the "educational arm" of the USDA. It urges that this role be strongly reaffirmed. Also it has felt that the Cooperative Extension Service logically should serve as the eudcational support arm for other governmental agencies as well as those of the USDA. There was a consensus on the part of the Committee that the local Cooperative Extension Office should be the one place where the individual citized can obtain information about the total array of programs and services available from federal, state, and local agencies of government, including those of the Land-Grant Universities.

The Joint Committee has fully accepted the notion that the Cooperative Extension Service should be the local point of contact between the public and the entire Land-Grant University.

In its report the Committee endorses the efforts of the Cooperative Extension Service to involve people directly in developing, executing, and evaluating local educational programs. The Committee urges that this approach be strengthened to the extent that there be a formal program planning group in each county of the Nation, and that such a group be a continuing one. The Committee felt that such groups not only are critically important, but that they also need to concern themselves with broad social and economic concerns. The Committee has viewed county program development process which involved local leadership as an ideal mechanism for combining and synthesizing national, state, regional, and local programs at the local level. The Committee feels that the local Extension staff should have major responsibility for organizing, maintaining, and supporting such a planning group.

Reassuring to many may be the Committee's recommendation that existing relationships with county governments be maintained. Nevertheless, it urges that greater efforts be made to develop other sources of local support, such as city governments, especially for those programs which are directed more toward urban audiences.

The Committee has recognized that in view of the recommended scope of Cooperative Extension Service programs, the colleges of agriculture and, for that matter, any other single college, do not, and cannot, contain all of the disciplines needed to support relevant field programming of the Extension Service -- not even those related to agriculture. The Committee is recommending that each Land-Grant University consider the development of administrative mechanisms within the University not only to permit, but to facilitate and encourage the accessibility of all relevant University competencies to the Cooperative Extension Service.

The Joint Study Committee noted the changes which have been made by Cooperative Extension in adapting programs to current needs of society. The Committee, however, indicates that significant additional modifications will be required in the decade ahead. Some of its recommendations pertaining to all program areas include:

1. Employing more specialized personnel to serve on an area basis.
2. Upgrading the professional competencies of personnel.
3. Increasing use of specialists' holding joint research, teaching, and extension appointments.
4. Experimenting with new organizational structures.

5. Employing personnel trained in disciplines relevant to the assigned educational role.
6. Increasing the use of consulting teams on a contract basis for special problems.
7. Increasing the use of non-Extension personnel hired for specific work on a part-time, one-time, or periodic basis.
8. Increasing the use of nonprofessionals.

The Committee has recognized that if Cooperative Extension is to fulfill its future responsibilities as a participating integrated unit of the University, the levels of professional competence, the salaries paid, and the general policies under which the Extension staff operates must be fully comparable to those of the research and teaching faculty members of the University.

The Committee structured itself into four subgroups for the purpose of examining in some depth what Extension's major program thrusts should be: (1) Agriculture and Related Industries, (2) Social and Economic Development, (3) Quality of Living, and (4) International Extension. These four areas also constitute the rubric of the portion of the Committee's final report dealing with programs. I could adhere to this same framework as I proceed, but it occurs to me that your interests as Extension Livestock Specialists conceivably are greater in some aspects of the report than in others. For this reason and because of time limitations, I have decided to organize my comments instead more around the three topics listed for your discussion group assignments this morning, namely:

Cooperative Extension's Responsibility to -
1. Commercial Farmers and Ranchers
2. Small Farmers and Ranchers
3. The Nation's Youth

In doing this, I shall attempt to extract from the total report the points most relevant to these three considerations.

With reference to commercial agricultural, the Joint Committee is insisting in its report that the Cooperative Extension Service maintain strong and effective educational programs to serve that sector. Indeed, the Committee felt that the question was basically not "whether" Extension should continue to serve agriculture, but "how" this might be most effectively and efficiently accomplished.

The future goals of agriculture include the best interest of the consuming public as well as those of the agricultural industry. For the decade ahead, the Committee saw the following broad goals for Cooperative Extension Service in commercial agriculture:

- Enable an increased percentage of farm operators to make more effective production and management decisions so as to earn returns for their land, labor, and capital on a parity with that which they could expect in nonfarm pursuits.

- Provide an adequate supply of food and fiber at reasonable prices for all Americans.

- Provide the capacity for increased exports of agricultural products abroad.

Extension agricultural programs must continually be modified to meet the priority needs of society. The Committee is recommending an increase of about 25 percent in agricultural programs by 1975. It projects that support for such programs will come primarily from local or state funds. This will be in contrast to the other major program areas examined in the report, where expansion was expected to be supported to a greater extent by federal funds.

The program content and approach for Extension farm production programs in the future should be significantly different from those of the past. The trend toward larger, more specialized farms is expected to continue as the number of small farms declines. The economic, social, political, and technical climate for producers will be significantly different.

Extension programs must be designed to fit the needs of differing sizes of business, as well as the different levels and types of specialization. Educational programs designed to improve managerial and technical efficiency on farms must help farmers to:

1. Determine their economic potential through analysis of alternative uses of their resources.
2. Organize their resources into more efficient and profitable production units.
3. Adopt more effective and economically feasible production technology.
4. Adjust output to market demands as related to quantity, quality, and seasonality of output.
5. Continually acquire and use more effective decision making and business management skills.
6. Compete more effectively in world markets.
7. Compete more effectively with synthetics and other substitutes for agricultural products.

An educational program designed to provide the above will require some shifts in emphasis of current programs with increased activity in:

1. Developing a more comprehensive and sophisticated understanding and capability to influence the economic stiuation, market outlook, farm policies, market structure, and other forces affecting decisions.
2. Improving "farm business administration."
3. Improving the efficiency of selection, procurement, and use of supplies, labor, and credit.
4. Improving design, construction, procurement, maintenance, and use of buildings and equipment.

There should be an increased percentage of effort on marketing, economics, and business management, according to the Committee's thinking. The Joint Study Committee is recommending that Extension programs in marketing, economics, and management be increased from the present 31 percent of the total effort in agriculture to about half of the Extension agricultural activity by 1975.

The Committee felt that the increasing impact of off-farm forces on farming and ranching businesses makes it increasingly important that operators understand the economic and political climate as a background for their farm decisions.

The administration of the farm business becomes increasingly important as

agriculture becomes more "capital related" and less "labor related." Knowledge of the organization of enterprises and the structure of the total business is an area of major need as producers procure supplies, labor, credit, and equipment from a wider range of sources and in increasing amounts. More alternatives in supply procurement require more information on use, performance, and relative cost. New developments in automated equipment and controlled environment systems make it necessary to expand educational programs concerned with design, construction, use, and feasibility analysis of such equipment.

The Joint Study Committee recommends that husbandry and basic production programs be continued at a somewhat reduced percentage of total effort, in relative terms - not in absolute ones. These areas are as follows:

1. Improving plant and animal nutrition and feeding. Extension emphasis will shift to an in-depth group teaching of principles and conduct of applied research. There will likely be a significant decrease in the proportion of time allocated to this activity as the expected rate of major technological developments decreases. However, more services in this field will be available from industry.
2. Improving plant and animal selection and breeding. Less proportionate efforts - which are time consuming - by Extension will be needed in improving selection and breeding of plants and animals due to the wider use and greater availability of superior seed stocks and animal semen from highly specialized industry sources. Emphasis will shift to helping operators understand genetic principles and their application to improving livestock and crop productivity.
3. Improving harvesting, storage and marketing.
4. Other cultural and husbandry practices. The rapidly rising level of technical know-how among farmers is enabling Extension to shift program emphasis from single practices to work on "unit production" systems. A large decrease in percentage of time allocated is indicated here because much educational work under this activity will be served mainly by industry or by Extension under enterprise management activities.
5. No change in emphasis is recommended in programs to control diseases, insects, weeds, and other pests.

A reduction in percent of time allocated to a given activity does not necessarily imply a reduction in manpower. The percentage of time devoted to any one activity will be influenced by man-year equivalents devoted to the total Extension program.

The Committee rationalized these recommendations in several ways. As agriculture becomes more complex, the supply industries will expand their capability to provide technical information, recommendations on practices, and individual farmer consultation. The Cooperative Extension Service programs in these areas should logically shift toward providing more in-depth training to producers and to wholesaling information through supply firms. Extension should not hold on to programs which can be as effectively performed by private industry. But it is not expected that private industry could or would provide all needed educational services. This implies reduction of "service" activities by Extension and heavier orientation toward education.

Organizational innovation should be thoroughly explored in order to apply the highest possible level of intensity and professional expertise to production, management, and related problems of producers. Use of teams of specialized personnel on problems requiring multiple disciplines is one technique suggested.

The Committee believes an increasing amount of highly specialized, in-depth training of industrial firm agriculturists will be provided by Extension and that charges will be made by Extension to defray a part if not all of the cost of such training. The Committee also expects an increase in the charging by Extension for assistance provided to large, highly specialized farmers.

The Committee is recommending an expansion of about 80 percent for all Extension marketing programs. The bulk of the increase in manpower will be for work beyond the farm level - with firms, systems, and new processes.

In addition to an increase in marketing education, the Joint Study Committee is recommending a substantial shift in emphasis to concentrate more heavily on educational programs on marketing and processing, expanding markets for agricultural products, and improving the efficiency of new farm supply and marketing enterprises.

Two other sections of the report deal with commercial agriculture: Forestry Production and Marketing and Soil and Water Conservation. Because of the time situation, I shall forego any examination of these two areas at this time.

I should like to point out that the subgroup of the Joint Committee that looked at Commercial Agriculture drew very substantially on the ECOP Agricultural Subcommittee Report entitled "Extension's Responsibility to Commercial Farmers and Ranchers." Its companion report, "Extension's Responsibility to Farmers and Ranchers with Gross Farm Income Less than $10,000," was utilized as background data by the Social and Economic Development Subgroup. Many of you, hopefully all of you, are familiar with these two significant reports. They and the Joint Committee Report are, I believe you will find, in harmony with one another and mutually supporting and reinforcing. The only difference really, I suppose, is that with the ECOP reports we ourselves are speaking to ourselves, whereas with the Joint Committee Report we have reflected the thinking about what Extension should be going on the part of people outside the organization. University Administrators, USDA Officials, and Legislators, it could be presumed, would listen more carefully to such a group than to us.

As concerns educational programs for small farmers and ranchers, who, as we know, constitute for the most part operators having limited or low returns, the Committee presumed that trends are working against this group. This may not be a politically popular position, but I cannot help but feel that it represents a valid one. Only a small percent of this group, it was recognized, can realistically be expected to move into the commercial category where they could achieve an acceptable level of living.

The Committee felt that Extension should identify those limited-income operators who have the potential, from the standpoint of interest, resources, and mental and physical capacities of lifting themselves, with help, into the commercial operator category. As they are identified they should be worked with very closely, through Extension educational programs in agriculture, to assist them in making the transition and maintaining themselves in this category. This would involve the functions of instruction in basic content, flow of information and consultation - the same as ones utilized in working with commercial operators generally.

But, as implied earlier, the Committee felt that for a large numbers of small operators, the prospect of elevating themselves into the commercial category was at best a remote possibility. This does not mean that Extension has any less

responsibility to them. Not at all. In fact, in the questionnaire I referred to earlier, the general public felt low-income farm families should be our number one priority target audience. It does mean that they have to be assisted in ways other than the ones which we use to assist commercial producers. It means we have to work closely with them to help them make rational decisions about alternatives facing them. For many, the best decision may be the one to abandon farming as a source of their livelihood. It was recognized that although Extension has a major responsibility to this group, ways of assisting this audience lay more in educational programs outside traditional production oriented educational programs - namely, through Extension programs in social and economic development. This is why in the Report, this problem was approached from this direction. Resource development efforts directed toward expanding job opportunities at the local level and at improving community services available to this group were particularly urged by the Committee. It was recognized that many needed help in job training and some even in basic adult education - leteracy training. While the report recognized that Cooperative Extension itself does not have competencies in all these areas, it felt that we had an important organizing and referring role to play.

It was in work with low-income farm families that the Committee especially felt that subprofessionals could make a contribution. In its report, the Committee visualized that one local Extension agent assisted by three subprofessionals and backed up by one specialist for each six agents, could work with 500 low-income farmers over a period of years. Using the estimate of 1.7 million low-income farmers who fall below poverty levels, it was projected that 3,360 agents, 560 specialists, and 10,080 subprofessionals would be needed.

In summary, the Committee recommended a doubling of resources for work with low-income farm and ranch families and that efforts be concentrated upon the nonagricultural factors affecting the welfare, vocational opportunity, and personal development of this important target group.

The Joint Study Committee approached educational programs for youth from the Quality of Living standpoint. It felt that Extension educational programs for youth basically must focus on human development. Any skill training engaged in is simply a means to a far more important end - that of the development of the individual.

Specifically, the Committee is urging that the 4-H program be directed to youngsters in all walks of life and from all economic levels - rich and poor, black and white, rural and urban. The program should become neither a poverty program nor a strictly middle-class activity, according to the Committee's thinking.

The Committee felt that a national examination of present rules of 4-H award programs was indicated. This was felt necessary to insure that these rules are not limiting factors in the appeal and value of 4-H programs to the greatest possible number of boys and girls.

The Committee is suggesting that Extension professionals spend more of their time with the eudcational aspects of the program, leaving organizational and operational aspects more to lay leaders and to the private sector. The utilization of nonprofessional program aides was seen as a way to expand youth programs, especially with disadvantaged youth.

While the report does not spell this out in detail, I know the Committee envisioned a considerable increase in the different kinds of project activities available to youth.

The Committee is suggesting that personnel to work in Extension youth programs should be qualified in disciplines relevant to education and motivation of youth. It is also recommending that additional youth educational activities be provided in cases where 4-H is not a suitable mechanism for meeting specific problems. An overall doubling of resources devoted to Quality of Living programs generally is being advocated by the Committee.

There are, of course, many, many aspects of the report which I have not been able to dwell on this morning - aspects that are of significance to you, to me - to all of us who are a part of this greatest of all adult educational systems. Hopefully, this glance at some of the areas on which the Study Committee focused will cause you to want to read and study the report in its entirety. When you do, I believe you will recognize its far-reaching implications. I predict it will rekindle your enthusiasm at being a part of this dynamic system of informal education.

It has been a pleasure to be with you this morning. I hope very much that your conference here this week will prove to be a worthwhile educational experience for you personally.

WHAT IS THE PLACE OF 4-H LIVESTOCK PROJECTS IN THE OVERALL 4-H AND EXTENSION PROGRAM 1/

Before we can answer the question that is asked by the title of this presentation, we must ask a few more. Before we define the place of 4-H livestock projects we must decide what we want them to do. (1) Are we interested only in blue and purple ribbons and the won-lost column? Please note that I used the term "only," so if you think that we are opposed to shows, please get that out of your mind. Shows and won-lost columns are very, very important, but this program must go deeper. (2) Are we interested "only" in teaching livestock production to 4-H'ers? (3) Are we interested in creating an interest in 4-H'ers that will cause them to remain on the farm? Yes, we are interested in all of these but not by themselves. Our number one objective should be developing better citizens that will make a contribution to the community in which they live. We are interested in raising youngsters, and these steers, barrows and horses are the tools that we can secure to help get the job done. You don't have steer shows, you have youngster shows. The steers are tickets that get the youngsters admission to the arena.

1/ Presented by Charles R. O'Kelly, Georgia Agricultural Extension Service, University of Georgia, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

The future of your state livestock program is dependent to a very large degree on your present 4-H livestock program. If you aren't doing 4-H livestock work in your state today, you as an individual won't be doing livestock work 10 years from now. However, I would hasten to point out that your successor probably will be.

Four-H work is not attached to an Extension program, it is a growing living part of it. It isn't grafted on, it grew there from the beginning and actually helped establish it.

We have made more overall progress in livestock in our state via the 4-H livestock route than any other way. Many herd sires have been bought so Junior could exhibit a "homegrown" animal.

Many herd sires have been bought because Junior learned enough in livestock judging that he criticized the ones presently owned.

Many outstanding boys have become animal science majors because agents have gotten the attention and interest of youngsters and guided them in that direction.

I heard a statement a sociologist made last week that tended to make my blood boil. He said, "You don't work with individuals and bring about change, you work with systems." Let's not ever forget that people make up systems and somebody has to work with individuals to mold them into a system before it can be worked with.

You people in the livestock business are very fortunate to have the kind of tools to work with that you have. Youngsters like to work with living, walking, moving things. This makes a livestock project a natural. Livestock shows carry with them a certain amount of glamour that corn, wheat, milo, forestry and other projects don't have. You can use this glamour to pull these youngsters just like Ramada Inn uses the big sign out there to attract people.

Since we all learn from each other, I'm going to give you a brief insight into the 4-H livestock program in our state. I do this without apology since I'm not talking about my program, but the program of Dan Daniel and his very fine staff.

In Georgia we are firm believers in 4-H livestock judging. We send a team about everywhere that we are admitted. For the past 10 years, over 80 percent of the youngsters that make the traveling squad go to college and major in animal science. Just think what they can do for a livestock program when they graduate and go out as assistant agents or as producers who can serve as local leaders.

Livestock projects rank fourth in 4-H Project Enrollment in Georgia with slightly over 18,000 members enrolled in some type of livestock project. The enrollment breakdown is:

Beef Projects	-	6,300
Swine Projects	-	4,650
Horse Projects	-	7,050

One of the most educational and interesting activities of our 4-H livestock project is livestock judging. This year 609 4-H members competed in six district

4-H livestock judging contests. Seventy-two of these won the right to compete in the State Contest. The Second Place State Team placed second in the American Royal Contest at Kansas City just a few weeks ago. This kind of accomplishment gives added impetuous to the 4-H livestock program.

Livestock judging gives more to a 4-H participant than a few nice trips or awards.

1. It develops an appreciation for quality livestock.
2. It helps youngsters learn to evaluate situations and select the best of the alternatives.
3. It develops the ability to make logical decisions based on facts and to be able to back up decisions by sound reasoning.
4. It enhances public speaking ability.

All of these attributes, of course, have tremendous carry-over into adult life regardless of the chosen vocation.

The fastest growing 4-H project in Georgia and most other states is another Livestock Project - The Horse and Pony Project. This project, which is only five years old in our state, already has attracted 7,050 members.

The six district shows in 1968 involved more than seven hundred boys and girls. The State Show which is limited to the first, second and third place class winners of the six district shows this year featured 150 exhibitors.

Numbers have grown steadily each year, but the improvement in horsemanship and quality of horses has outstripped the increased enrollment.

An activity which stirred considerable interest this year was our first 4-H horse clinic. One hundred and twenty 4-H members and their horses came to the University of Georgia for a week. The horses were stabled at the Coliseum and the 4-H'ers housed in University Dormitories. This was their first taste of college life.

Four-H'ers were assigned to groups according to their ability and experience. Under the guidance of professional trainers and exhibitors they participated each day for a week in two hours of riding labs, lectures, movies and practical demonstrations. Each 4-H member cared for his own horse, cleaned the stalls and put in about 16 hours of work and learning experience each day.

Our own Extension staff, the School of Veterinary Medicine, the American Quarter Horse Association, as well as professional trainers contributed to the effort.

At last report all 120 4-H'ers were anxious to come back next year - with a friend.

This is an activity that is just beginning. A really big horse boom is ahead. Nationally we will have 35 million more people by 1975. In the meantime, shorter work weeks, more suburban and rural living, and the continued recreation surge with emphasis on physical fitness and the out-of-doors will make this activity more popular than ever.

One thing we are doing in Georgia that means a great deal to our 4-H effort

is to have what we call a District Project Achievement Meeting in each of the six districts in our state. At this meeting, the county champions in the various projects and activities come together to compete for district honors and for the Senior 4-H members, the priviledge of attending the State 4-H Congress. At the State Congress, held in Atlanta our Capitol City, the senior district champions vie for state honors and the priviledge of representing the State at the National 4-H Congress in Chicago.

In the livestock program, there are three areas from which a boy or girl may choose - Beef, Swine or Horse - to participate. Once they have chosen an area - beef, swine or horse - then they carry out activities and participate in learning experiences under the supervision of the county Extension agent and/or volunteer 4-H leaders. Instructional manuals as to what to do and how to do it are furnished each participant on the local and/or county level. The participants keep a record of their activities. A county champion is selected in each of the areas of livestock activities; that is, beef, swine or horse. Then, these county champions from within each district come together and give a method demonstration or illustrated talk on something they have learned in their livestock work. These demonstrations are judged along with the record books and district winners are selected. The senior district winners in the various projects and activities are brought to Atlanta for the State 4-H Congress where they vie for state honors and the priviledge of attending the National 4-H Congress.

Interest in the District Achievement Meetings and State Congress runs extremely high. For example, at district last year there were 160 participants in beef, 138 in swine and 214 in horse.

This system not only helps build a strong 4-H livestock program in every county, but develops tremendous support for 4-H Club work by the top business leaders of the state.

I know many of you have very strong 4-H livestock programs. If you do, I would bet you have strong administrative backing for such a program. It's easier to get this support if the total 4-H program is strong and well supported. If your state does not enjoy this type support it's never too late to start developing it. Any administrator is likely to support those efforts that bring credit to his organization. Are you sure your 4-H livestock program measures up?

In our state we expect virtually every staff member to devote some time to 4-H club work. We are convinced this makes for a stronger 4-H program and total Extension program than the assignemnt of one or two staff members in each subject matter area to do youth work.

Does every one on the Extension staff know what your program is? You also need to know about theirs. You can accomplish this in many ways---We use two primary methods:

1. State Extension Program (What Can Be Done)
2. Annual Planning Conference with District Agents and Specialists

But no doubt the most important single factor for an effective program is a highly qualified animal science staff, with a leader (Department Head) that has a keen interest in youth work and one who can "get the job done" with the administration--with youth and with business leaders.

Four-H youth work is magic. We can take advantage of this magic in developing an effective 4-H livestock program.

Extension business is people. Yours more specifically is livestock people. The more livestock people that you have thinking like you want them to think, the better off your livestock program will be. The time that you spend doing 4-H livestock work may well be the most important time that you spend. It is your future, guard it, protect it and guide it in the right direction and the results will be very rewarding.

HOW DOES AN OUTSIDER SEE THE VALUE AND PLACE OF 4-H LIVESTOCK PROJECT 1/

I am concerned this morning about the title of the subject we are to talk about. It shows me, as an outsider, giving advice to insiders, and as you know, I come from a state where when outsiders come in and try to tell insiders what to do, the insiders put the outsiders inside a sack and drop them in a creek. With that in mind, let's say rather we are going to discuss for a few minutes the place and problems of the 4-H livestock projects, and let's establish one point right at the beginning. I did not come here to fight.

So let's start with a point on which we are all in agreement. The 4-H livestock project is basically a tremendously worthwhile endeavor. If that is not true, the extension service has been exhibiting bad judgment for a long time in expending as much time and effort on this phase of their work as they do, and associations such as the one I represent are equally guilty of bad judgment for annually expending such a high percentage of their limited budgets in helping sponsor 4-H livestock programs.

You know, we repeat so often the objectives of junior livestock work, they sometimes get to sounding trite, but there is nothing artificial about the necessity of teaching today's youngster the responsibility of regular and routine daily chores, or the patience required working with project animals that do not always turn out as hoped, or the financial judgment that comes from investing "own dollars" in an animal and the feed it eats, or the character strengthening effect of competition, win or lose. These are real, they are worthwhile, and they are the reason for the time, effort, and money expended by all who understand the objectives of livestock project work.

Moving to the next point of agreement, I don't believe there will be any argument from anyone currently aware of the ins and outs of junior livestock programs when we state we are faced with some horrendous problems. Let me assure you, I do not have any ready answers or easy solutions to these problems, but one of the reasons

---

1/ Presented by Dave Pingrey, Mississippi Cattlemen's Association, Macon, Mississippi, at the Southern Regional Livestock Specialist's Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

meetings of this type are held is to let many heads ponder troublesome situations, and with that in mind, let's dive right in.

To our way of thinking, the professionalized steer is one of our greatest problems. The calf fed and fitted in professional purebred surroundings and by the same type personnel, then turned over to the youngster on show day, proves disheartening to all other youngsters in competition and certainly tarnishes the image we are attempting to project. I will be the first to admit I do not know what we can do about it, because rules are rarely a corrective medium. The honest person observes them, and the crook uses them to his own advantage. Perhaps the answer would be to shift the emphasis by concentrating premiums and prestige on home-bred commercial steer classes, or as in our state, the youngsters who show county-bred commercial steers. To qualify, the steer must be a produce of a non-registered cow and be calved in the county where the junior exhibitor resides. Concentrating attention on this type project does several things. It increases the impetus to improve Dad's commercial cattle, it more nearly involves the interest of dirt-farmer type people in the county, and in most instances, it will convince a lot of people we have commercial cattle good enough to be winning these steer shows. This takes a little pressure off the purebred boys who are constantly being teased to let Johnny have the best bull calf dropped in that calf crop.

Problem number two, which is much the same type as the professionalized steer, is the disinterested kid. Dad is all excited and wants to win, but Junior could care less. It ends up being Dad's project with Junior reluctantly leading the animal show day. Nobody gains from this, and it has been my experience this type situation produces more judge baiters, program knockers, and general gripers than any other single category in the junior livestock program. If Dad wants to be a 4-H Club boy again, let's set up something where he can actually hold the halter and compete with people his own age. Here again I realize we have a difficult situation, and except for calling to the attention of the adults what the real objective of the program is,ie., child development, I don't know exactly what we can do.

Leaving human problems for a minute, let's talk about a phase of our program which may be misdirected. We are talking about the breeding hiefer project. With our current judging methods and attitudes, generally the kid who does the best job ends up with the least valuable heifer. She has been fattened to where she will almost surely be a marginal milker, and in most cases, a slow or non-breeder. This is the place where I think we can be of help. Let's instruct the judges to roll these fat heifers and rearrange our acceptance standards so a heifer can be champion and still a potentially useful brood cow. The boys in Tennessee have done a good job of this, and as a result, have a very strong junior heifer program that has laid the foundation for some very good purebred herds.

Along this same line, with the older boys, why not concentrate a little more on the bull project? Very few junior showmen are going to damage a bull's usefulness by over-feeding, and when the project ends up, somebody can use the project animal--either the youngster, his Dad, or some neighbor. The child has had the experience, and in the process, he has produced an animal potentially capable of livestock improvement in his area.

While we are talking about size in junior exhibitors and attempting to match project animals to youngsters' physical capabilities, let's not overlook the lamb project as a real good one for the little fellow. Possibly we can do something about the disinterested child if we can keep from over-matching him with his animal

early in his project life. I have no doubt that at least some of the seeming disinterest we mentioned a moment ago is actually the masked fright of a youngster who, as a little fellow, started a couple notches too high. The lamb requires fewer dollars to purchase, eats less feed, and can be handled with less demanding facilities. Certainly they don't fit everywhere, but when they do we need to give them real consideration for junior members.

Another thing we can do is instruct our junior show judges to consider the sureness with which an animal is handled in the show ring in making their final placements. Of course, we are going to hear some criticism that the best animal should win, but the best animal we are most concerned about is the best two-legged animal in the ring. After all, let's keep our objective in mind; and we believe the youngster who cannot handle his project animal show day has not been sufficiently dedicated to that animal's development and training to rate the top award.

Then, too, let's keep the project work challenging. The Danish system of handing out 19 blues, 12 reds, and 3 whites in one class of livestock might work well in Denmark, but America is a land of competition. We have already stated one of our objectives is tempering these youngsters in a competitive climate, and let's not water it down. Let's set up each class for a first place blue, a second place red, and a third place white ribbon, and for the youngster who gets the tenth place brown ribbon, that ribbon will mean something more in the long run that a tenth place blue, for after all, they were a dime a dozen.

We would certainly be derelict in our assignment of discussing livestock project work if we did not discuss the tremendous value of the judging and demonstration teams. Actually, we believe these are two of the most important phases of our entire program. We realize there is a psuedo-scientific segment of the industry that would have us believe visual appraisal of livestock is obsolete. I don't want to deal very long with a discussion of this attitude, for it simply raises my blood pressure and makes me unpleasant the rest of the day. How any supposedly educated person can be so narrow as not to realize the money in the livestock business changes hands on the basis of eyeball is difficult for me to understand. The computer, scale, probe, all of these are important in helping determine the most efficient combination of physical characteristics we can have in our livestock, but the fact is, people cannot carry these tools with them when they are buying and selling thousands of head of cattle a day, often from horseback, top rail of the fence, or jeep seat. So let's don't get trapped off in our thinking. Human judgment is still the most important ingredient of a sound livestock operation.

There is another thing to remember. Nothing is more important in today's requirement for success than for a person to be able to stand on his two feet, look a stranger in the eye, and tell him, sell him, or convince him. We live in a people world, and communication is essential for the successful man regardless what business he's in. When our youngsters tell a stranger why they placed a class of livestock the way they did, or why this type head catch should be constructed on your farm, they are moving themselves forward regardless of whether agriculture is their ultimate end or not.

And then, finally, let's frankly speak about the biggest value determiner in the whole program. That's the assistant county agent. He more than any other individual or ingredient decides what value will be gained from livestock project participation in his county. Assistant agents, like druggists and farmers, come in all shapes, sizes, and motivations. Unfortunately, our pay scale does not properly differentiate, and if somebody wants to come up with a real valuable

computer, let him perfect one that will have all deadwood assistant agents evaporate and increase the real leaders' salaries three-fold. I don't believe such a computer is yet on the drawing boards, unfortunately.

We could talk the rest of the day about this or that phase of livestock project work, but that was not the assignment. We were asked to evaluate, and I think we can all agree we are talking about a mighty worthwhile phase of American youth development. It is worthwhile enough that events of this type where the best heads available are brought together in an attempt to improve it are an absolute necessity. The 4-H livestock project has rendered tremendous service to America in years past. With some of the unnerving youth movements and attitudes we see currently in evidence, it is more important than ever that we keep our livestock project work challenging, up-dated, and effective. We must continue to have this vital program available for and attractive to American youth.

ANIMAL SCIENCE AND ENVIRONMENTAL HEALTH 1/

Not too many years ago animal manure was considered an asset for improving and maintaining soil fertility. Now it is cheaper to obtain fertilizer by the bag or tank. Thus, what was once a resource has become a problematical waste.

The nation's domestic animals produce through manure, bedding, abattoir refuse, and dead carcasses an estimated two billion tons of wastes each year. This approximates the wastes produced by a human population of 1.9 billion. Almost one-half of the animal waste is produced by the large confinement-type of operations. Further these operations have magnified the problems of both waste handling and social or esthetic nuisances.

Labor and equipment related to removal, transportation, and ultimate disposal of these wastes represent a significant cost to the animal producer. A study conducted in Michigan in 1961 indicated that costs to feedlot operators were $ 3.43 per head marketed for waste disposal. The cost to dairymen was $ 9.29 per head. In Mississippi, the waste handling cost for a million-bird laying operation was estimated at $ 100,000 or 10 cents per bird annually.

Equally serious problems are associated with esthetics. In Milford, Texas, a 27,000 head cattle feedlot was established in what was considered a reasonably remote rural area. Now with the encroaching suburbia, eleven damage suits averaging $ 15,000 each have been filed against it. In New York, a Sullivan County poultry producer was confronted with a temporary restraining order by the State Supreme Court pending the outcome of a $ 125,000 lawsuit because noxious odors were permeating two nearby resort areas.

1/ Presented by H. G. Geyer, USDA, Federal Extension Service, Washington D. C., at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

These few examples point out there must be intensified efforts to: (1) Identify and destroy or control odor producing bacteria in manures; (2) Treat manure to make it less attractive as a breeding ground for insects and vermin; and (3) Explore and develop better procedures for manure utilization without polluting air, soil, or water.

Obviously, animal manure is only a part of the problem. It is alleged that the nation's air, water, and land is being contaminated faster than nature and the present human efforts can cleanse them. How could this occur? Man has manipulated the environment to meet his presumed immediate and long-term needs without adequate consideration or knowledge of the subsequent long-term effects. Organisms and plants of no apparent value were eliminated without consideration of their role relative to the energy flux of the environment. Neither have we given adequate consideration to the diverse and novel materials now being dispersed into the atmosphere, land, and water or their potential for impairment of health and longevity of man and animals. Anything that jeopardizes either affects livelihood and the related social amenities.

The President's Science Advisory Committee in the report, "Restoring the Quality of Our Environment" defines environmental pollution as, "The unfavorable alteration of our surroundings, wholly or largely, as a by-product of man's actions, through direct or indirect effects of changes in energy patterns, radiation levels, chemical and physical constitution and abundances of organisms. These changes may affect man directly, or through his supplies of water and of agricultural and other biological products, his physical objects or possessions, or his opportunities for recreation and appreciation of nature". Subsequent to the issuance of this report in November 1965, and under the leadership of the Office of Science and Technology, government agencies were requested to indicate their interest in major problem areas, equate their relevancy and priorities, and clarify inputs.

It was during these preliminary meetings that it became quite evident that Extension would be expected to assume a major role in the eudcational aspects of pollution control in the rural areas. In April 1967, Extension, along with other USDA agencies, was requested to designate its programs or activities that were pertinent to the Advancement of Scientific Understanding of Natural Communities and Their Interactions With Man. Some of the areas pertinent to livestock were: Safe and Proper Use of Chemicals, Waste Disposal, Water Quality Control, Wholesome Food Supplies, Pathogens, Pest Control, Engineering, and Farm and Home Safety.

In December 1967, FES was again requested to participate in a Task Force on QUALITY OF THE ENVIRONMENT - Pollution in Relation to Agriculture and Forestry. The charge of the Task Force was to prepare a national program for research and scientific manyear needs through the year 1977. Subject areas covered in this report were:

1. Animal and Domestic Wastes
2. Processing Wastes (a. Animal, b. Crop, c. Forest)
3. Infectious Agents, Toxins, and Allergens
4. Plant Residues
5. Sediment
6. Plant Nutrients
7. Mineral and Other Inorganic Substances
8. Pesticides
9. Radioactive Substances
10. Airborne Chemicals and Particulates

11. Noise
12. Heat
13. Socioeconomic Aspects
14. Systems Analysis

In June 1968, FES participated in an Interagency Group on Agricultural Pollution with the charge to identify existing and needed Action Programs. The following represent the subject areas pertinent to animal agriculture.

A. Sediment

1. Minimize soil erosion and curbing sediment delivery from agricultural lands.

B. Animal Wastes

1. Minimize pollution by improving management, facility, and disposal systems.

   a. Improved handling
   b. Technical assistance
   c. Financial assistance

2. Alternate uses for manures

   a. Animal feeds
      (1) Research and development
      (2) Action, cost sharing

3. Land use and zoning programs

   a. Land use research and utilization
   b. Small watershed programs
   c. Action programs, zoning

4. Education - Information Programs

   a. Undergraduate, graduate programs
   b. Extension programs
   c. National waste management information systems

5. Establishment and Enforcement of Standards

   a. Research instrumentation, methods, monitoring
   b. Establishment of standards
   c. Surveillence and enforcement

C. Processing Wastes

1. Modernization of harvesting and processing
2. By-product recovery and utilization
3. Treatment and disposal of wastes from processing plants
4. Changes to make agricultural materials that are more readily processed

D. Inorganic Salts and Minerals

E. Crop and Forest Residues

F. Plant Nutrients

G. Pesticides

1. Evaluate nature, extent, significance, and impact of pesticides on ecosystem
2. Reduce amount of hazardous pesticides in the environment
3. Treat, control, or remove pesticides from soil, plants, air, and water

H. Air Pollution

In June 1968, a Departmental Food Safety Work Group was established with the assigned responsibility to "strengthen and expand those programs and activities designed to guard against both old and new sources of contamination". The Work Group is to give special attention to problems -- both existing and potential, within the outside the Department -- relating to food contamination within the following general areas:

1. Microorganisms Contamination
2. Drugs, Chemicals, Antiobiotics
3. Environmental Contamination Affecting Food Safety

In summary, society has become cognizant of the undesirable changes occuring in the physical, chemical, and biological characteristics of air, land, and water, and the potential harmful effects that may be wrought upon man and the other species of animals and plants upon which he is dependent. Through this cognizance, new societal demands on animal agriculture are to be anticipated. This is already in evidence in Kansas, Nebraska, and California where operators of confined animal feeding operations must register for permits to do business.

Registrants are required to provide information on topography, drainage course, and identification of primary receiving streams. Statutes also specify minimum pollution control facilities for cattle, swine, sheep, and other animals. These actions point out that agriculture is not an entity unto itself, but an integral part of the total ecological and social structure.

Effective environmental planning in animal agriculture will depend upon problem identification and coordination. Pollution problems transcend numerous disciplines; all talents must be used. Urban, industrial, regional, and agricultural planning of the last 30 years has been in response to presumed socio-economic needs. Meeting the future needs will demand revision of some of the current modes of thinking. For example, it seemed logical to have a feedlot near the market place. It would reduce transport time, reduce shrink, bruises and other stresses. Now the operation is faced with complaints of air and water pollution, a perpetrator of insects, noise, and odors and the economic problem of manure disposal. Dairymen in Los Angeles have experienced this noncombatibility with the urban sector. Within the last six years, 43 dairies representing 12,000 cows were forced to relocate. Total relocation costs for this group, for milking facilities alone, were estimated at over $ 1,600,000. Obviously, the wastes associated with animal production represent a high priority problem. Because

they pollute streams aquifer systems, they are a source of infectious agents, obnoxious odors, insects, toxic gases, and dusts tha cause human discomfort. To resolve these problems will challenge everyone associated with agriculture. In an effort to meet this challenge, some States have organized Extension Environmental Health offices where the talents of concerned and responsible disciplines specialists can be consolidated for structuring effective educational programs on improving the quality of the environment. Within the Southern Region, Alabama has taken the leadership. How this functions will be discussed by the Division's Chairman, Dr. Hilmer Jones.

ALABAMA'S ENVIRONMENTAL HEALTH PROGRAM 1/

There is no doubt in my mind but that Extension education must expand. In fact, all educational efforts must expand to keep pace with our population growth and the changing characteristics of this population.

As Extension workers, you have probably come to believe, as I have, that a formal education to all people in all the disciplines necessary to keep pace with all the events and changes taking place today is just not possible today and it will never be possible. Too, you have come to believe, as I have, that Extension education can and must bridge this ever widening gap.

I'm sure that there is no disagreement on the effectiveness of Extension in disseminating useful and practical information and encouraging its beneficial application. You have all been extensively involved in this effort in the area of agriculture and the livestock industry. But can we do it in other areas? Can we expand our horizons and meet new challenges and opportunities thrust upon us both as citizens and as professional educators?

Across this country we as a nation are engaged in an intensifying struggle to satisfy the economic, social, cultural and welfare needs of an exploding group of people. These are changing needs...there is not one of us in this room, and very few back in the communities where we live and work, whose needs are the same as they were last year - to say nothing of five years ago. These needs will be met. Make no mistake about that. They could be met by the formation of new agencies or new groups at the national level, or even the state level; I propose to you that Extension can meet these needs, in the main - if we address ourselves to the need now. If we wait, someone else will do the job without us. One such need lies now and is developing in the area of environmental problems, some of which are health in nature.

The relationship of the individual to his environment today is a major factor contributing to his welfare. We are beginning to recognize that happiness and well being extends beyond the area of economics.

1/ Presented by Hilmer L. Jones, D.V.M., Auburn University, Auburn, Alabama, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

All too frequently we consider our environment as an endless and bountiful product of God's handiwork. A product to be used as we see fit. There is a lack of realization that our environment whether good or bad is, in part, the product of man's own creation. All the activities that take place in this environment are related to human goals - efforts to satisfy human needs. It is, to a major extent, what we make it. It is a resource which is influenced, sometimes adversely, by human attitudes and behavior.

There are problems emerging from our environmental activities which are becoming of critical concern at the local, state and national level. Environmental pollution is a fact and one which directly or indirectly affects the health, social, cultural and economic welfare of every citizen. Man is no longer an isolated entity. He can no longer do what he pleases in the way he wishes without giving consideration to how his actions may affect his fellow man. This situation will not lessen in view of the vast increases in agricultural and industrial growth, population expansion and changes in living standards and habits. It is an adverse state which will continue to grow in severity and hinder us unless corrective means are divised, instituted and practiced.

What are some of the areas of environmental health and objectives of our Alabama program? Briefly, those of particular concern include: 1) Pesticide-Chemicals in the areas of agricultural chemicals, feed additives, household chemicals and medicines. The improvement of the proper and safe use of these to minimize or eliminate residues in food products and preventing accidental poisoning needs increased attention; many of you are involved in the use of many agricultural chemicals. Whether it be from a direct use yourself around your home or farm or related to your recommendations in a livestock production program. As production efficiency becomes more competitive and as new technology brings about more potent compounds for use, food for human consumption must be kept wholesome and free from residues of these products; (2) Water Pollution related to providing a safe supply of water for household use, livestock and recreational activities: the water pollution problem has become urgent chiefly because we are allowing the organic content of surface waters from human, agricultural and industrial wastes to approach the saturation point. The self-purifying power of these waters are being stressed to the point of near viological collapse: in an average community in Alabama or in most any other community around our country, the industrial growth along with population increases are creating almost unbearable pressure on our streams and rivers for disposing of wastes; (3) Rural Civil Defense and the development of protection of our rising rural urban population and their families, crops, livestock and foodstuffs from radiation hazards is of increasing importance. Maybe civil defense is not important just now from a potential warfare standpoint, but every community should have a plan for any emergency, whether from warfare or natural disasters. We have more to lose today because of increasing concentration of people and things. (4) Air Pollution and its increasing threat to our general health and welfare: this problem, primarily of our bigger cities at present, is being shared by our rural-urban people through wind currents, migration of industries and factors associated with growing communities. Although comprehensive data on the exact effects of air pollution on man and animals is lacking, present information is sufficient to warn us that its health effects may worsen faster than the pollution level itself. Recent estimates of the proportions of air pollution today include: 135 million tons of air pollutants fall on the U. S. each year: this costs each person in the U. S. at least $65.00 per year from economic damage or increased cost of goods; (5) Garbage and Refuse Collection and disposal is a growing problem of every community no matter what the size. Every person generates, on the average, 1500 pounds per year of solid

wastes which must be disposed of in a manner which does not contribute to environmental sanitation problems. (6) More important to you I should point out is that domestic animals generate an estimated two billion tons of wastes per year. This is equivalent to the wastes from 1.9 billion people. As our demands for livestock products grow to meet the needs of a projected 320 million people in the next 35 years, what are we going to do with it? Seven poultry generate as much waste as one human being. Thus, one million birds are equivalent to 150,000 people in this regard - and we had in Alabama last year, nearly 350 million. If my figures are near accurate, this approximates 50 million people in terms of wastes to say nothing of the millions of birds that die each year weighing two pounds average. Further, estimates are that one cow produces wastes equivalent to 15-20 human beings, and one hog produces as much wastes as 2-3 human beings. Using figures from your own state, you can calculate that these wastes amount to a staggering total. Sure - we're aware that these wastes are currently being diluted into our environment without too much problem. But how long can this go on? What do we know about the persistence of pathogens in these wastes? What are the potential health hazards? No one yet has the answer but many of you are involved and you should assess your own potential problems. (7) Expanded Control of Disease Vectors primarily insects and rodents: (8) Increased Attention to Diseases transmitted from animals to man and related to growing numbers of both and to their closer living quarters: (9) General Health Education directed particularly at the rural populace, particularly with regard to environmental sanitation.

One can see from the above discussion of some of the environmentally related health factors, that these are associated with our agricultural expansion, industrialization and growth of our population. Associated also is our urbanization and concentration of people along with changing standards and habits of living. Environmental health must encompass not only the dangers of sickness but also the joys of living. Environmental health is more than a means of survival. It has become a social value.

On our behalf, our governments spent an estimated $400 million in 1967. Projected capital expenditures may reach $1 1/2 billion this year.

Our attitudes must develop increased consistency with the times in which we live. Those who ought to know are insisting on a sense of urgency to mobilize all the available talents to work on these problems. This certainly includes <u>you</u> as important leaders in your own state and community extension programs.

Admittedly the factors associated with and contributing to our environmental problems related to health are vast and diverse and they are frequently difficult to grasp and to deal with effectively. Too, the problems that are occuring may arise in areas we have not worked with previsouly. For example, how are we to deal with water pollution problems associated with large and non-agriculturally oriented industries: or how do we deal with air pollution from the automobile or from a steel industry - we who have been accustomed to dealing with field crops, livestock producers and homemakers?

Yet, someone must deal with this vast and diverse area if we are to keep pace with the problems and needs of our time. <u>We who are experienced educators and experienced organizers of group actions must take the leadership role in this new effort</u>.

The solution to improved proper use of pesticides, reduced accidental poisoning cases, improved wastes disposal, increased control of disease carrying pests,

safer water supplies, reduced air pollution, cleaner streams in which to fish and boat, food supplies free of harmful residues of pesticides and drugs, a better rural civil defense system, reduced transmission of infectious disease from animal to man and man to animal - solution to these and the many, many other environmentally related problems rests in education. It rests in developing a better understanding about how each activity taking place around us affects another part of the environment. It rests in creating an awareness that each part of the environment is related to another part in some way. The solution also rests in conceiving new ideas and innovations to focus on and deal with these problems. It rests in generating among the general public a better understanding of how the individual is involved, how he is affected and what he can do to help. Although regulatory principles have been, and still will be employed, they cannot by themselves be wholly successful. It is true that present laws must be better enforced and new ones must be developed, but an uninformed public cannot be successfully regulated: a well informed public on the other hand, supports regulatory measures and will insist on others being devised when warranted. Education provides this basis.

You might ask the question - why Extension? And I will ask you in turn - what other organization is structured, experienced and, in the main, staffed with the necessary discipline technology to carry out such a broad public educational program. What other organization is better equipped to interpret the scientific answers to these problems in such a way as to bring about practical public understanding and to generate action? In your answer lies much of Extensions' future.

We in Alabama have been given a unique opportunity to prove that Extension can do more than improve field crop and livestock production: more than help homemakers provide better family living conditions in the home. Ours is a first kind of program. It shapes up like this:

First, Extension administration in Alabama made the decision to establish a new program dealing with the broad aspects of environmental problems with emphasis on health related aspects - health of people as well as agricultural commodities including animals, crops, fish and wildlife and other components of the environment such as bees and beneficial insects.

Second, another division or department within the Alabama state staff organizational structure was established and labeled "Environmental Health."

Third, the staffing of this new program came from within the ranks of those specialists already spearheading programs related to the new objectives with exception of the Extension apiculturist who was added from a county position.

These include: pesticide education specialists, entomologists, veterinarian, rural civil defense specialist, apiculturist and fish and wildlife specialist.

Fourth, with guidance from Extension administration and others on-campus and off-campus, the staff of this new division developed objectives and committed themselves to their role in this new assignemnt. These objectives have been previously outlined. Priorties were agreed upon.

Next, the major task was selling the idea, the program and methods of implementation to our county workers and other state staff personnel. This was done through an in-service training program and staff seminars. This effort is still continuing.

Meanwhile back on-campus, we were busy acquainting other groups about our new program: school of agriculture, school of veterinary medicine, vocational agriculture and research workers.

At the same time, TV, and radio programs and newspaper articles were proclaiming the new program.

And the counties were organizing their county environmental health committees thru which information will be disseminated. Representation on this county committee which is part of our overall county extension council, includes: pharmacists, physicians and veterinarians, county health workers, pension and security, FHA,Homemaker council, 4-H, civic clubs, garden clubs and others.

We have been pleased with the attention which our efforts are receiving and the extent to which the general public is responding. We are more convinced than ever that such a program is needed and that Extension is making and can continue to make valuable contributions to our society by being involved in this somewhat new field.

VIRGINIA'S TEN YEAR CROSSBREEDING PROJECT WITH ENGLISH CATTLE 1/

Crossbreeding research has been carried on in Virginia by R. C. Carter, J. A. Gaines, W. H. McClure, D. W. Vogt, and the late C. M. Kincaid. To date the research has been conducted in two phases with the first having the objective of determining the effects of crossbreeding among straightbred English cattle and the second to investigate the comparison of crossbred females versus straightbred females. Phases I and II are now complete.

In Phase I 120 cows were assembled for the project. The herd was composed of 40 Angus, 40 Hereford and 40 Shorthorn females. Females were selcted at random statewide with only one female coming from each farm. This provided a representative sample of the females within the breed in Virginia. To keep the project representative of the cattle population bulls were changed each year and bulls of different pedigrees were used each year. The crossbred bulls involved in the first phase were likewise changed annually and different pedigree crosses were involved each year. Thus, the first phase was completed with cattle that were as near representative of Virginia cattle population as possible.

In Table I it will be seen that the big advantage of crossbreeding in this experiment is fertility. Females weaning crossbred calves weaned approximately 10 percent more than cows weaning straightbred calves. The advantage in weaning weights of crossbred calves over straightbred calves was in the range of four percent. When this difference of weaning weight and fertility is combined it results in better than 50 pounds of calf per cow bred in favor of the crossbred calf. There was practically no difference in feeder grade whether the calf was straightbred or crossbred.

Table I: Weaning Performance

	Calving %	Weaning %	Weaning Wt.	Pounds Calf Cow Bred	Grade
Straightbred	85	76	406#	309#	11.8
Crossbred	92	88	422#	371#	11.6
3 Way Crosses	89	84	420#	353#	11.3
Backcross	93	87	412#	358#	11.5

Following weaning heifers in the first phase were put immediately on feed and finished at slaughter weights around 775 pounds. It will be noted in Table II that crossbred heifers gained faster than straightbred heifers. Here again the feedlot gains were approximately four percent faster in favor of crossbreds. There was no significant difference in carcass grade.

1/ Presented by C. C. Mast, Extension Specialist, Virginia Polytechnic Institute, Blacksburg, Virginia, at the Southern Regional Livestock Specialists Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

Table II: Heifer Post Weaning Data (1st Phase)

	Feedlot Gain	Slaughter Weight	Carcass Weight	Carcass Grade
Straightbred	1.70	754#	448#	11.6
Crossbred	1.75	783#	458#	11.4
3 Way Cross	1.76	796#	469#	11.0
Backcross	1.79	790#	468#	11.1

Steers in the first phase were managed different than the heifers. Following weaning they were wintered on a modest ration, grazed one season and then finished with a short feed. It is interesting to note in Table III the crossbred and 3 way cross steers gained considerably better through the wintering and grazing period than did the straightbreds. Backcross steers responded approximately the same as straightbred. This resulted in the crossbred and 3 breed cross steers going into the feedlot at weights approximately 35 to 40 pounds heavier than the straightbred and backcross steers. It will be noted, however, that after going in the feedlot at approximately 20 months of age there was no difference in feedlot gain between the four kinds of steers indicating that heterosis for growth had terminated at around 18 or 20 months of age. It will be noted that the final slaughter weight was 35 to 40 pounds in favor of crossbred and 3 way cross steers over straightbred and backcross steers and all of this advantage was gained before entering the feedlot. There was no significant difference in carcass grade.

Table III: Steer Post Weaning Data (1st Phase)

	Yearling Gain	Yearling Wt.	Feedlot Gain	Slaughter Wt.	Carcass Wt.	Carcass Grade
Straightbred	1.03	774#	2.28	1066#	623#	11.3
Crossbred	1.11	816#	2.28	1109#	657#	11.3
3 Way Cross	1.10	810#	2.27	1100#	663#	11.2
Backcross	1.02	774#	2.27	1063#	638#	11.1

An interesting side light in the first phase is cow performance as illustrated in Table IV. Here the fertility of the Angus and Hereford cows is the same with Shorthorn cows weaning about six percent less calves. Weaning weights for Angus and Shorthorn cows was the same with Hereford cows some 20 pounds less. Translated into pounds of calf per cow bred it is noted that the Hereford and Shorthorn cows were approximately the same with Angus cows 20 pounds heavier.

Table IV: Cow Performance (1st Phase)

Breed	Calving %	Weaning %	Weaning Wt.	Pounds Calf Per Cow Bred
Angus	92	86	423#	364#
Hereford	92	86	399#	343#
Shorthorn	86	80	425#	340#

In Phase II the same size cow herd was used and it was made up of an equal number of crossbreds and straightbred cows as nearly representative of the breed as possible. An equal number of crossbred females and straightbred females came out of each herd. Al purebred cows were bred to crossbred bulls and crossbred cows to purebred bulls resulting in a calf crop that was genetically the same for each herd of cows. All calves were either three breed or backcross. Here again bulls were changed each year.

In Table V it will be noted from a production standpoint there was little difference in the weaning percentage of straightbred and crossbred females, while the crossbred females actually did calve three percent more calves. In weaning weight there was 20 pounds difference, however, in favor of the crossbred females. Pounds of calf weaned per cow represented 20 pounds in favor of the crossbred females. There was no difference in feeder calf grade.

Table V: Cow Comparison (2nd Phase)

Dams	Calving %	Weaning %	Weaning Wt.	Pounds Calf Per Cow	Weaning Grade
Straightbred	92.9	88.4	436#	385#	11.9
Crossbred	95.5	89.0	454#	405#	12.1

The calf crop in the second phase was all fed directly after being weaned. Steers were fed to approximately 925 pounds and heifers to 775 pounds for slaughter. It will be noted in Table VI that the feedlot gain of calves from straightbred females was practically identical with those of crossbred females. The weight advantage at weaning time, however, still remained with the calves produced by the crossbred cows. There was no difference in carcass grade.

Table VI: Post Weaning Steer Data (2nd Phase)

Dams	Daily Gain	Slaughter Wt.	Carcass Wt.	Dressing %	Carcass Grade
Straightbred	2.13	920#	547#	59.8%	12.7
Crossbred	2.16	945#	563#	59.7%	12.0

Likewise in Table VII the feedlot performance of heifers was identical from the two kinds of dams. Here again the final weights were influenced by the difference at weaning time. Carcass grade was again the same. In this research project the advantage gained by the crossbred dam is in weaning weight and not in subsequent feedlot performance.

Table VII: Post Weaning Heifer Data (2nd Phase)

Dams	Daily Gain	Slaughter Wt.	Carcass Wt.	Dressing %	Carcass Grade
Straightbred	1.87	761#	451#	59.0%	11.8
Crossbred	1.86	780#	464#	59.5%	11.7

An interesting side light in Phase II is the comparison between performance of backcross and 3 breed cross calves. In Table VIII we see an advantage of 16 pounds in favor of the 3 breed cross calves over backcrosses when produced by purebred dams. From crossbred dams, however, this difference is reduced to nine pounds in this experiment.

Table VIII: Backcross Versus 3 Breed Cross Weaning Weights
(Steer and Heifer Average)

Purebred Dam:	Weaning Wt.:
Backcross	430#
3 Breed Cross	446#
Crossbred Dam:	
Backcross	452#
3 Breed Cross	461#

Following the performance of these calves in Table IX after they go in the feedlot we see a difference of .05 pounds daily gain in favor of the 3 breed cross over backcrosses in both calves produced by purebred and crossbred dams. Inasmuch as these data have not been statistically analyzed it is not known whether this small amount is significant or not. Whether or not there is difference in backcrosses and 3 breed crosses from purebred dams is purely academic because they are not likely to be produced this way, however, from crossbred dams the difference is small in the range of two percent but consistent.

Table IX: Backcross Versus 3 Breed Cross Feedlot Gains
(Steer and Heifer Average)

Purebred Dam:	Feedlot A.D.G.:
Backcross	1.95#
3 Breed Cross	2.00#
Crossbred Dam:	
Backcross	2.00#
3 Breed Cross	2.05#

Table X has interesting information relative to the performance of the various crosses in Phase II. There was very little difference in weaning percentage of cows straightbred or crossbred as a group. Within the crossbreds there was variation, and the straightbred Shorthorns were lower than other straightbreds. There was quite a wide spread in weaning weights from the different kinds of cows involved. The Shorthorn Angus cross which had the lowest percentage of calves weaned had the highest weaning weights. The straightbred Hereford cows which were near the top in weaning percentage were nearly bottom in weaning weight. The straightbred Angus cows in this experiment weaned 417 pounds of calf per cow bred and were exceeded by only the Shorthorn Hereford, and Angus Hereford crossbreds. When these data were translated into terms of pounds of calf per 100 pounds cow body weight the straightbred Angus cows were exceeded by none of the crossbred cows. When one examines Table X in terms of pounds of calf weaned per 100 pounds body weight it raises the question whether or not a breeder would want to pursue a two breed or a three breed cross.

Table X: Straightbred Versus Crossbred Cows (5 Years)

Breed or Cross	% Calves Weaned	Weaning Wt.	Pounds Calf Per Cow	Pounds Calf Per 100 Lbs. Cow Wt.
Angus	93.0	449#	417#	44.0#
Hereford	93.8	420#	394#	37.7#
Shorthorn	85.6	441#	378#	41.8#
S X H	94.1	470#	442#	43.2#
H X S	94.4	423#	399#	36.9#
A X H	95.8	465#	446#	41.4#
H X A	87.5	431#	377#	37.0#
A X S	86.0	465#	400#	36.8#
S X A	82.0	488#	400#	36.8#

Phase I of this experiment would lead one to believe that two breed cross calves have the maximum heterosis. Fertility and growth rate seems to be at its maximum with the two breed cross. With English breeds of cattle the advantage of

growth rate in crossbred cattle seems to be in the neighborhood of four percent and in weaning percentage approximately 10 percent. In this experiment there was 50 pounds more calf produced by cows having crossbred calves than those having straightbred calves. In the crossbred-straightbred cow comparison the advantage seems to be approximately 20 pounds of calf in favor of the crossbred cows for both weaning weights and pounds of calf per cow bred. There seems to be no difference in the feedlot performance of calves whether they are out of straightbred or crossbred cows. In Phase II there was a small difference in favor of 3 breed cross calves over backcrosses.

BRAHMAN CROSSES IN SOUTHERN CATTLE BUSINESS 1/

Crossbreeding is accepted without reservation in crop production because of what it has meant in increased yields of hybrid corn, sorghums and Bermudagrass. Most people fully expect "hybrid vigor" will be harnessed to provide further breakthroughs in production of food crops. Crossbreeding has already made significant contributions in swine, sheep and poultry production. It has been discussed by cattlemen because most are aware that it offers potential benefits in production if they can contrive to capitalize on them. This breeding system must be well understood, systematically carried out through proper management, and it must be followed by effective marketing before the potential benefits can be realized. If these things are done, the hybrid individual brings out a latent productive potential which is present in all pure breeds.

No longer is there any doubt regarding the benefits of crossbreeding in beef cattle production. The only question is how long the industry can afford to by-pass a solid 25 percent potential advantage. The United States is blessed with a considerable number of pure breeds of cattle from which to draw breeding stock for systematic, scientifically based crossbreeding programs. Some adjustments in the national breeding plan will be necessary, but these can be made.

There are two main reasons for crossbreeding: (1) to combine the desirable characteristics of two or more pure breeds to form a new breed or type with greater adaptability to a given environment, or for some other specific purpose, and (2) to produce hybrid vigor.

Not many cattlemen are interested in creating new breeds or types of cattle, but it is being done. Examples are such breeds as Santa Gertrudis, Brangus and Charbray. On the other hand, hundreds of cattlemen are taking advantage of the increased productive potential brought about by hybrid vigor.

An F_1 hybrid is the result of cross mating animals of two different breeds. The hybrid expresses increased productivity over the average of the parent breeds

1/ Presented by J. K. Riggs, Professor, Animal Science Department, Texas A&M University, at the Southern Regional Livestock Specialist's Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

in numerous ways - hardiness, thrift, reproductive ability, milk production, growth rate, etc. This increase in productivity is termed "hybrid vigor" and is the opposite of the depressed productivity resulting from inbreeding which consists of mating related animals such as full brother and sister, sire and daughter, half brother and sister or cousins. The closer the relationship between individuals mated the more intense is the inbreeding of the resulting offspring, and the greater is the depression in vigor or productivity. Put another way, loss of vigor is proportional to the intensity of inbreeding, and gain in vigor is proportional to the genetic diversity of the animals crossed. Hence, mating sire to daughter, dam to son, or full brother and sister within a pure breed would be expected to result in marked reduction in vigor and consequently in productivity. Conversely, mating a male of one breed to a female of another breed would be expected to produce marked vigor in the resulting offspring. The level of increased vigor is dependent on the breeds crossed because of their degree of genetic diversity. Cross mating Brahman to British breeds tends to produce a higher level of vigor than does cross mating British breeds because the Brahman and British breeds are genetically much more diverse than are the British breeds, Angus, Hereford and Shorthorn. The Charolais, Brown Swiss and other European breeds also appear to be genetically quite different from the British breeds, but not so different from them as are the Zebu types.

The level of vigor also varies from one characteristic to another. Those characteristics which are highly heritable, and hence respond strongly to selection within a pure breed, show a low level of response of vigor due to crossing, while characteristics which are low in heritability usually show a high level of response to crossing.

Hybrid vigor is maximum in the F_1 animals and is partially dissipated in the F_2 or in the backcross. If an F_1 is mated to an F_1 of the same kind, the vigor is approximately halved in the resulting F_2. The same effect results when the F_1 is mated or backcrossed to an animal of one of its two parent breeds. Approximately half of the vigor remaining in the F_2 is again lost in the F_3 produced by mating F_2 to F_2. This halving of vigor continues with mating F_3 to F_3, F_4 to F_4 and so on, with the ultimate result that is some later generation, mating crossbred to crossbred leaves no hybrid vigor at all. This is the reason that mating crossbreds to crossbreds is not recommended for commercial producers. Therefore, it is obvious that crossbreeding not only creates hybrid vigor but also dissipates it if the proper procedure is not followed. One of the major problems is to maintain hybrid vigor by continually tapping the purebred to restore it either through crisscrossing two breeds or rotating three breeds or more. Contrary to popular opinion, purebred breeders stand to gain immeasurably from widespread commercial crossbreeding because successful crossbreeding is absolutely dependent upon the availability of adequate numbers of purebreds with which to renew vigor.

Since hybrid vigor is manifested in increased thrift, hardiness, reproduction, mothering ability etc., and since the cows have to live out their useful lives subjected to the stresses of changing weather, feed conditions, gestation, parturition and lactation, it is obvious that it is more beneficial to have hybrid vigor in the cow herd than in the bulls. Additionally, a hybrid cow unavoidably has a hybrid calf of some sort which benefits from its greater vigor in the transformation from uterine to outside life resulting in higher calf survival rate and percentage calf crop weaned. The increase in survival and growth rate of calves comes from added vigor in both cows and calves and the benefits from the two can scarcely be separated.

Selection is less effective and predictable in crossbreds than in purebreds. Never-the-less, the most successful producers must take advantage of hybrid vigor in those traits which show the greatest response to crossbreeding as well as of selection for those traits most responsive to selection. For producers not greatly inclined to keep the detailed records so necessary for maintaining heavy and constant selection pressure, crossbreeding may be an out. The greatest benefit from selection in a crossing operation will probably come from the use of bulls highly selected for merit when brought into the herd to renew vigor. This would be true particularly for such traits as tenderness, ribeye area etc., which are high in heritability and contribute to carcass merit and value.

The influence of cross mating on pregnancy, calving and weaning percentages is shown in Table 1. The differences among breeds and crosses were highly significant in all categories. Pure matings of Brahman x Brahman and Hereford x Hereford showed the lowest values while cross mating these two breeds gave marked increases

Table 1: Percentages of Pregnancy, Calves Born and Calves Weaned Based On Number of Cows Exposed to Bulls.

Matings involved			Percent	Percent	Percent
Sire	x	Dam	pregnant*	born	weaned
B	x	B	79	72	56
H	x	H	81	77	74
B	x	H	93	93	89
H	x	B	92	92	87
B	x	½B ½H	91	91	91
H	x	½B ½H	98	96	96
A	x	½B ½H	83	82	81
A	x	½A ¼B ¼H**	100	100	100

* Determined by palpation
** Results of only one year

in percentage conception and survival of calves. The F_1 females showed up particularly well in percent of calves weaned except when mated to Angus bulls. The latter case suggests possible genetic and/or physical (size of cow vs. size of bull) incompatibilities.

The highly significant differences among breeds and crosses in pregnancy, calving and weaning percentages suggest rather striking differences in calf losses which are shown in Table 2. Most calf losses occur after birth. The pre-calving losses from pregnant cows amounted to 3.0 percent for pure Brahman matings and 2.1 percent for pure Hereford matings. Cross mating these two breeds reduced the loss to zero. Losses from all hybrid females were also essentially zero. On the other hand, losses from birth to weaning amount to 20.5 percent for pure Brahman and 2.2 percent for pure Herefords, but cross mating the two breeds gave losses of 4.7 and 4.0 percent, respectively. The low level of vigor in the pure Brahman calves was evident as shown by the 23.5 percent calf loss and by the fact that cross mating the Brahman cows lowered the total calf loss from 23.5 to 4.7 percent. This effect was not observed with Hereford cows. Brahmans are not adapted to calving in the cold wet months, and calving earlier or later in the year reduces the calf losses to about those observed for other cows. Total calf losses from hybrid females were zero except for F_1 females mated to Angus bulls (1.8 percent).

The comparative importance of having hybrid vigor in the sires and in the

dams is shown in Tables 3 and 4, respectively. When Brahman, Hereford and crossbred (½B - ½H) sires were used with Hereford cows the maximum hybrid vigor effect in weaning weight of calves was 9.8 percent and ranged down to 2.7 percent (Table 3). This was probably because of the genetic limitation on milk production of the Hereford cows which could not be increased beyond a certain point by the greater

Table 2: Percent of Calves lost Before and After Calving

Matings involved			Percent lost		
Sire	x	Dam	Conception to birth*	Birth to Weaning**	Total
B	x	B	3.0	20.5	23.5
H	x	H	2.1	2.2	4.3
B	x	H	0.0	4.0	4.0
H	x	B	0.0	4.7	4.7
B	x	½B ½H	0.0	0.0	0.0
H	x	½B ½H	0.0	0.0	0.0
A	x	½B ½H	0.9	0.9	1.8
A	x	½A ¼B ¼H	0.0	0.0	0.0

* Calves lost as percent of cows pregnant
** Calves lost as percent of cows that calved

Table 3: Influence of Breeding of Sire on Weaning Weights or Calves from Hereford Cows at Sonora, Lufkin and McGregor, Texas

Breeding of		Weaning weight, pounds	Advantage for crossbreds	
Sire	Dam		Pounds	Percent
		Sonora, 1921-29		
Hereford	Hereford	373		
Brahman	Hereford	383	10	2.7
		Lufkin, 1944-57		
Hereford	Hereford	421		
Brahman	Hereford	450	29	6.9
		McGregor, 1951 - present		
Hereford	Hereford	386		
Brahman	Hereford	424	38	9.8
½B-½H	Hereford	418	32	8.3

stimulating effect of nursing crossbred calves and therefore did not permit the calves to express their greater growth potential. Hybrid calves have been shown to be more frequent and more vigorous in nursing behavior than are purebred calves. On the other hand, when Hereford or Brahman bulls were mated to F_1 ½B-½H cows, the hybrid effect on weaning weight of calves observed over more than 40 years at three locations ranged from 18.9 to 21.9 percent (Table 4). The halving effect on vigor in backcross females, either 3/4H - 1/4B or 3/4B - 1/4H, is evident from the 11.6 to 12.7 percent hybrid effect on weaning weights of calves from those cows.

That hybrid cows produce more milk than do cows of their parent breeds is clearly shown in Table 5. F_1 cows exceeded Herefords by 81 percent, Brahman by 76 percent and the average for the two parent breeds by 79 percent. Second cross cows, produced by mating F_1 females to Angus bulls, exceeded Herefords by 73 percent, Brahmans by 68 percent and the average for Herefords and Brahmans by 71 percent. The F_1 females exceeded the younger second crosses by only 5 percent. These milk yields are uncorrected for age of cow which is known to have a significant effect. The Hereford and Brahman cows were the dams of the F_1 cows, which in turn, were dams of the second crosses. If corrected for age it seems likely that the milk yield of the second crosses (third breed introduced) would equal or exceed that of their more mature F_1 dams.

While Brahmans are known to produce milk higher in percent butterfat than do the British breeds, the percent of solids-not-fat is much the same and percent of total solids, which is the sum of butterfat and solids-not-fat, varies mainly due to the variation in percent of butterfat (Table 6). Calf weaning weight is significantly correlated with yield of milk as well as yield of butterfat, solids-not-fat and total solids. Therefore, it seems evident that a major reason for the

Table 4: Influence of Breeding of Dam on Weaning Weights of Calves at Sonora, Lufkin and McGregor

Breeding of Dam	Breeding of Sire	Weaning wt., Lb.	Advantage over Herefords Pounds	Advantage over Herefords Percent
		Sonora, 1921-29		
Hereford	Hereford	373		
½B-½H*	Hereford	448	75	20.1
		Lufkin, 1944-57		
Hereford	Hereford	421		
½B-½H	Hereford	513	92	21.9
¼B-3/4H	Hereford	470	49	11.6
		McGregor, 1951 - present		
Hereford	Hereford	386		
½B-½H	Hereford	467	81	21.0
Hereford	Brahman	424	38	9.8
½B-½H	Brahman	459	73	18.9
3/4B-¼H	Brahman	435	49	12.7

*B designates Brahman and H designates Hereford

Table 5: Average 24-Hour Milk Yields of Hereford, Brahman, Firstcross ½B-½H and Secondcross ½Angus-¼Brahman-¼Hereford Cows

Breed or cross of cow	Milk yield, lb.*	Percent advantage over H	B	H&B	Secondcross
Hereford	7.4				
Brahman	7.6	3			
Average for H & B	7.5				

Table 5: (Continued)

Breed or cross of cow	Milk yield, lb.*	Percent advantage over			
		H	B	H&B	Secondcross
Secondcross ½A-¼B-¼H	12.8	73	68	71	
F_1 ½B-½H	13.4	81	76	79	5
Average	13.1			75	

*Uncorrected for age of cow

Table 6: Average Percentages of Butterfat, Solids-Not-Fat and Total Solids in Milk From Brahman, Hereford, Firstcross and Secondcross Cows

Breed or cross of cow	Percent Butterfat	Percent Solids-not-fat	Percent Total solids
Brahman	5.2	8.8	14.0
Hereford	3.2	8.6	11.8
F_1 ½B ½H	3.6	8.4	11.8
Secondcross ½A-¼B-¼H	3.6	8.9	12.0

heavier weaning weight of calves produced by crossbred cows is the higher level of milk produced which permits more complete expression of the growth potential of the hybrid calves. Composition of milk had little influence as compared with quantity of milk.

Milk production and weaning weight show strong responses in the hybrid. Both of these traits are lower in heritability than is feedlot gain after weaning. We expect a lower response in post-weaning gain in hybrids for that reason, and the point is illustrated in Table 7. The F_1 calves show 10 percent increase in daily gain over the average of the two parent breeds but only 3 percent over calves of the breed with the better record. F_2 calves produced by mating F_1 to F_1 show the loss of vigor which is likely to occur when crossbreds of the same kind are intermated. On the other hand, introducing a third breed by mating Charolais bulls to F_1 Brahman-Hereford females produces calves which show a further increase in gain over that of the F_1 calves. The data are not shown on this point.

Carcass quality in F_1 British breed crosses has been fully equal to that of pure British breeds; in some instances slightly superior. Some question has been expressed concerning the slaughter and carcass characteristics of F_1 Brahman x British cattle. Table 8 gives a thorough comparison of Hereford and F_1 slaughter steers which were all raised on their dams in the same pastures until weaned at 180 days, then fed identical feed mixtures for 140 days, slaughtered and the carcasses cut using standard procedures in the meat laboratory at Texas A&M. The impressive point is the similarity in yield of the major cuts from these two rather different kinds of cattle. This similarity of cut-out values tends to underscore the importance of the greater productivity of the hybrid cattle since their faster growth and greater weight at a given age will be reflected in greater carcass weight with essentially the same percentage yields of major carcass cuts. A similar comparison of Hereford and second cross steers (Charolais introduced) as slaughter calves and yearlings is presented in Table 9.

Table 7: Comparison of Hereford, Brahman and Crossbred Calves in Post-Weaning Feedlot gain during 140-Day Test

Breeding of Sire	Dam	Calves*	Average daily gain, lb.		Advantage for crossbreds, %**
Hereford	Hereford	Hereford	2.36		
				2.20	Base point
Brahman	Brahman	Brahman	2.04		
Hereford	Brahman	F_1 (½H½B)	2.43		10
Brahman	Hereford	F_1 (½H½B)	2.44		10
F_1	F_1	F_2 (½H½B)	2.16		3 loss

* 2,031 calves involved in comparisons
** Advantage over the average of the two pure breeds, 2.20 pounds

Table 8: Slaughter and Carcass Characteristics of Short-Fed Yearling Hereford and Brahman X Hereford Steers

Item	Mean Value Hereford	Brahman x Hereford	Probability of chance occurrence
Number of steer	59	90	
Slaughter live weight, lb.	743.5	782.2	.001
Chilled carcass weight, lb.	445.7	490.1	.001
Dressing percentage, chilled	59.9	62.6	.001
Area of eye muscle, unadjusted, sq. in.	8.45	9.00	.05
Carcass grade	High good+	High good-	N.S.
Percent hindquarter	49.7	50.2	.01
Percent forequarter	50.3	49.8	.01
Percent rib	8.9	8.9	N.S.
Percent short plate	6.8	6.9	.05
Percent foreshank	4.4	4.2	.001
Percent brisket	4.9	4.8	N.S.
Percent chuck	25.2	24.9	.01
Percent flank	5.6	5.7	N.S.
Percent full loin, trimmed	16.1	15.6	.01
Percent round, rump on	24.7	25.1	N.S.
Percent cushion round	15.4	15.5	.10
Percent high-priced cuts (loin+rib+round, rump on)	48.8	49.9	N.S.
Estimated percent lean in carcass	58.3	58.6	.05
Estimated percent fat in carcass	27.5	26.1	N.S.
Estimated percent bone in carcass	15.4	15.4	N.S.

Source: Journal of Animal Science, Vol. 16, no. 1 (February, 1957)

TABLE 9. SLAUGHTER AND CARCASS CHARACTERISTICS OF HEREFORD AND ½ CHAROLAIS-¼ HEREFORD-¼ BRAHMAN SLAUGHTER CALVES AND YEARLINGS. STEERS*

Item	Average Values			
	Calves*		Yearlings*	
	Hereford	½ Ch ¼ H ¼ B	Hereford	½ Ch ¼ H ¼ B
Number of steers	16	16	15	15
Slaughter live weight, lb.	457	529	743	859
Chilled carcass weight, lb.	266	316	439	509
Chilled car.wt./day age, lb.	1.1	1.4	1.1	1.3
Dressing percentage, chilled	58.3	59.8	59.2	59.4
Carcass grade	good-	stand.+	good-	stand.+
Area of rib eye/cwt. chld. carcass	2.2	2.3	1.9	1.8
Percent chuck	26.2	26.1	25.2	25.0
Percent rib	8.3	8.0	8.6	8.3
Percent loin	14.6	14.9	14.7	14.9
Percent round, rump on	27.5	27.9	25.2	25.7
Percent loin + rib + round + rump	50.4	50.8	48.5	48.9
Fat cover over rib eye, in.	0.2*	0.2*	0.8	0.7
Shear force, lbs. (tenderness)**	9.4	10.4	7.7	8.0

* Calves slaughtered at weaning time. Steers slaughtered after 154-day feeding period following weaning.
Averages based on 10 calves.

** Values up to 8.5 considered to be tender; 8.5 - 11.5, medium; over 11.5, tough.

Quite obviously the advantages offered by the hybrid in reproduction, percent of calves weaned, weaning weight of calves and post-weaning gain are additive. Economic benefit should be assessed in its sum total rather than on the basis of the isolated traits, and the total must be weighed against the better parent breed to provide a realistic comparison. A recent summary prepared by Cartwright and Butler from 16 years of results at the McGregor station in Texas portrays this cumulative effect of hybrid vigor on beef production per cow.

Percentile Increase of F_1, H-B Dam with Backcross Calf Over the Better Parent

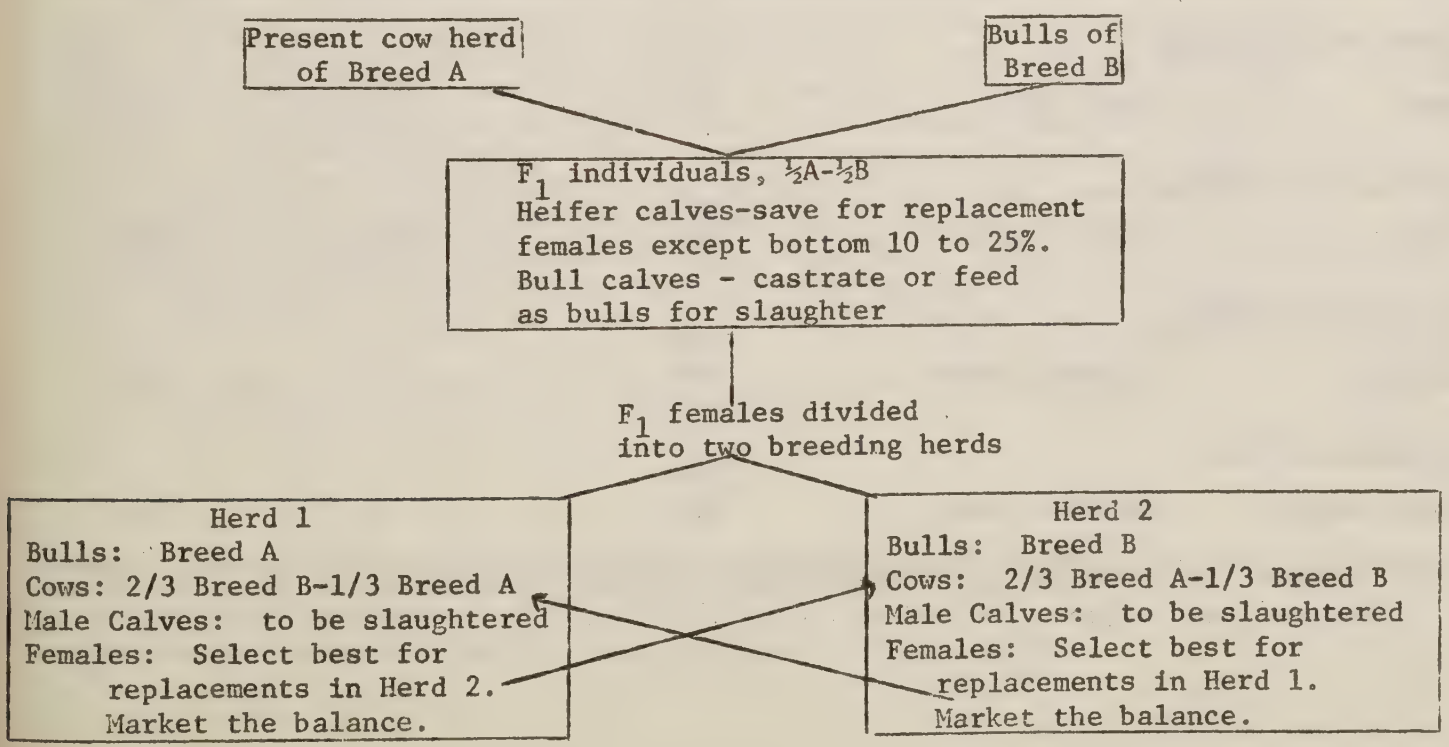
Increase in calving %		Increase in % survival		Increase in % weaned
5.2	+	.5	=	5.7

Cumulative Advantage in Beef Production Per Cow over the Better Parent

Increase in % weaned		% increase in wean wt.		% increase in daily gain		Increased production per cow
5.7	+	16	+	3	=	24.7%

Following a systematic program is essential in crossbreeding. If this is not done properly, hybrid vigor will be lost or the cattle may become virtually mongrelized. Two methods are briefly outlined here.

Criss-crossing using two breeds.



This plan produces first cross cows which are excellent mothers which can be backcrossed to either parent breed of bulls. As soon as numbers are large enough, these first cross females are divided into two herds. One herd uses only bulls of breed A and the other only bulls of breed B. These two herds remain intact with no change in breeding management as follows:

Heifers produced in Herd No. 1 are selected and placed in Herd 2 for replacements and heifers produced in Herd No. 2 are selected and placed in Herd No. 1 for replacements. It is important that the bulls are always mated to the cows which are most distantly related to them in order to maintain hybrid vigor at the highest level. As the program continues over a period of years under the same breeding system, the two herds stabilize at approximately 2/3 Breed A and 2/3 Breed B. Both herds are always bred to purebred bulls.

Rotational crossing can involve three or more breeds. This method is intended to keep the cow herd highly heterozygous for maximum vigor, and each successive calf crop, sired by a different breed of bull, carries at least 50 percent of that breeding. At two stations we are trying five-breed rotations and the results look particularly encouraging for at least a three breed rotation. Some weaning weight results are shown in Table 10.

Herefords and Brahmans were mated to produce F_1 females which were mated to Charolais bulls as the third breed. This mating produce weaning weights 24.9 percent above the Herefords in the same three-year period. Mating the second cross 1/2 C- 1/4 B- 1/4 H females to Angus bulls gave weaning weights 21.0 percent above Herefords during the same four years, but the females were younger and weaning weights were not corrected for age of dam.

Table 10: Comparison of Weaning Weights in Herefords and Rotational Cross Herds in the Same Years with Advantage for Crossbreds

Breed or cross of*		205-day weaning weight, pounds	Advantage for crossbreds	
Dam	Sire		Pounds	Percent
Three-year average				
H	H	429		
½B½H	H and ½B½H	495	66	15.2
Three-year average				
H	H	410		
½B½H	C(third breed)	510	100	24.9
Four-year average				
H	H	380		
½C¼B¼H	A(fourth breed)	466	86	21.0
Two-year average				
H	H	393		
½A⅛C1/8B1/8H	S(fifth breed)	434	41	14.3

* B - Brahman, H - Hereford, C - Charolais, A - Angus, S - Shorthorn

A point of special interest in this work covering 10 years, was that hybrid females with first calves produced weaning weights 96 percent as heavy as those from mature cows. Hereford females produced weaning weights 86 percent as heavy as those from mature cows.

The rotational plan followed is given below:

Hereford cows x Brahman bulls = F_1, ½B½H
F_1 cows x Charolais bulls = Second cross, ½C¼B¼H
Second cross cows x Angus bulls = Third cross, ½A¼C1/8B1/8H
Third cross cows x Shorthorn bulls = Fourth cross, ½S¼A1/8C1/16B1/

The second cross calves mothered by F_1 cows and sired by Charolais bulls were the heaviest yet produced and give strong encouragement for the three breed rotation. Santa Gertrudis and Brown Swiss bulls have produced quite similar weaning weights with F_1 cows. Second cross cows mated to Angus bulls have done nearly as well as younger age and we feel these females are genetically enough different from the Angus bulls to produce high vigor. However the resulting third cross females appear to carry too high a level of British breeding to be mated to Shorthorn bulls although this particular mating produced calves 14.3 percent heavier than the Herefords in the same two years.

U. S. D. A. CROSSBREEDING SUMMARY 1/

Comprehensive analyses have been made of the data from an extensive crossbreeding experiment. This experiment is being conducted at the Fort Robinson Beef Cattle Research Station. This experiment involves the Hereford, Angus and Shorthorn breeds. In the first phase of this experiment, the three straightbreds and all reciprocal crosses among them were produced. Heterosis or hybrid vigor was evaluated by comparing the crossbreds with the average of the straightbreds. Crossbreds and straightbreds were sired by the same bulls and out of comparable cows. These studies involved an evaluatioon of the effects of hybrid vigor on embryo survival, post-natal mortality, birth weight, preweaning growth rate, weaning weight, weaning conformation score, postweaning growth rate and yearling weight of heifers developed under two management programs, age and weight at first heat of heifers developed under two management programs, postweaning growth rate and yearling weight of steers on a growing-fattening ration, postweaning feed efficiency of steers on a growing-fattening ration, slaughter grade of steers and detailed information on carcass characteristics of steers involving complete cut-out data on one side of each carcass. These studies included a total of 751 calves from four calf crops sired by 16 Hereford, 17 Angus and 16 Shorthorn bulls.

The effects of hybrid vigor were significant for most of the economic traits

1/ Presented by Keith Gregory, U. S. Meat Animal Research Center, Clay Center, Nebraska, at the Southern Regional Livestock Specialist's Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

evaluated. A three percent greater calf crop was weaned in the crossbred than in the straightbred calves because of differences in early postnatal mortality. The heterosis effect on 200 day weight was 24 pounds in heifers and 16 pounds in steers. The heterosis effect on postweaning growth rate of heifers on a low level of feeding was greater than in steers on a growing-fattening ration. The magnitude of the heterosis effect on growth rate was related to level of feeding and age. That is, heterosis or hybrid vigor tended to decrease with increasing age after approximately one year and was greatest on a restricted feed intake when comparing heifers with steers. The heterosis effect was 50 pounds on 550 day weight of heifers and 29 pounds on 452 day weight of steers. The heterosis effect on carcass weight at 452 days was 23 pounds for steers. Heterosis effects on age at first heat of heifers were 41 and 35 days for low and moderate levels of feeding, respectively. After adjusting age at puberty for the effects of average preweaning and postweaning daily gains, approximately one-half to three-fourths of the heterosis effect on age at puberty (days) remained. Thus, there was a heterosis effect on age at puberty independent of its effects through average daily gains.

The advantage of the crossbred steers in feed efficiency was small. The crossbred steers produced slightly fatter carcasses when killed at the same age. However, when adjustments were made for the effects of weight, there was no difference in carcass composition. Thus, if they had been slaughtered at the same weight, the composition of the carcasses would have been the same.

In net merit (value of the boneless, closely trimmed retail meat, adjusted for quality grade, minus feed costs from weaning to slaughter) the advantage of the crossbred steers over the straightbred steers was $8.81 per carcass. This net merit difference is among the steers that lived to slaughter. The three percent advantage for the crossbreds in calf crop weaned was not involved in computing this difference.

For growth, feed efficiency, and carcass traits, the heterosis effect was greater in the Hereford-Angus and Hereford-Shorthorn combinations than for the Angus-Shorthorn combination, while for age and weight at puberty, the heterosis effect was greatest for the Hereford x Shorthorn and reciprocal cross. In evaluating all traits for the effects of heterosis, it can be concluded that heterosis results in an increased rate of maturity.

The second phase of this experiment is now in progress. This involves the evaluation of the effects of hybrid vigor on fertility and mothering ability. That is, straightbred cows of the three breeds are being compared with their crossbred half sisters when both are bred to the same purebred bulls. For the five years (1963, 1964, 1965, 1966, and 1967) on which data have been collected, the advantage of the crossbred cows has been 17, 6, 10, -3, and 11 percent, respectively, for calf crop weaned and 17, 31, 20, 22, and 27 lbs., respectively, in average weaning weight of calves at 200 days. The results of heterosis effects on cow performance traits (fertility and mothering ability) should be regarded as preliminary because data are still being collected from this phase of the experiment.

Selection of superior purebred bulls is just as important in a crossbreeding program as in a program of using only one breed (straight-breeding).

FUTURE OF CROSSBREEDING AND STRAIGHTBREEDING IN BEEF CATTLE 1/

It is fairly clear that a pound of beef from weanling calves can be produced more efficiently from smaller cows. It is also clear that the feedlot operator benefits more from a calf that has potential for a lot of gain at a fast rate. The feedlot operator benefits more from a calf with a larger growthy sire and dam than a calf from a smaller sire and dam. Actually, the feedlot operator likes to pick up calves that are light weight because of sparse feeding but healthy with gain potential. There is a definite conflict of interest between the producer selling calves at weaning and the feeder who either grazes, backgrounds or puts them directly in the feedlot.

There is another conflict that is important. We evaluate beef cattle as separate individuals rather than as a total herd. We tend to consider the weights of our calves at weaning and neglect considering the total weight of saleable beef from a given acreage or the return on capital investment. Is there possibly a conflict between the desire to have "show cattle" or even "big, rugged cattle" and profitable cattle? We talk about a good bull or a good cow or sometimes a good herd of cattle. We don't bother to consider what they are good for. Are they good for producing the product you are in business to produce? Do they produce more profitable when all the inputs and outputs are considered? I like to characterize this conflict by contrasting "Better cattle breeding" to "Breeding better cattle."

I want to emphasize considering the entire herd as a unit and plan from that viewpoint. Considerations used to establish a base for planning sound beef breeding are given below:

1. Genetic potential for rate of gain tends to increase as genetic potential for mature size increases. The correlation is generally high though not perfect.

2. Efficiency of feed convertion at a given weight tends to increase as rate of gain increases. The correlation is very high.

3. Feed required for maintenance increases as body weight increases. The increase is proportional to weight to the 3/4 power; e.g., a 1200 pound cow is 1/2 again heavier than an 800 pound cow and requires about 1/3 again more feed (or pasture land) for maintenance.

4. On average, almost two cattle are required in the herd to produce one slaughter steer or heifer. This approximation is based on 80 percent net calf crop, 13 percent of cow herd replaced each year and four percent purchased bulls. Feed utilization of the cow herd is much more important than that of the sale calves with respect to the producer.

1/ Presented by T. C. Cartwright, Professor, Animal Science Department, Texas A&M University, at the Southern Regional Livestock Specialist's Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

5. Slaughter weight which is optimum for obtaining greatest beef production for nutrient input tends to increase as rate of gain increases, cattle price increases, or feed costs decrease. Compare different type cattle only when the calves are taken to their best weight. For example, a steer with a weight potential for gaining 2.0 pounds per day at 10 months of age should be slaughtered roughly at 900 pounds at todays prices while one with gain potential of 2.5 pounds per day reaches optimum slaughter weight at 900 pounds, 2.7 pounds per day at 1000 pounds, 3.0 pounds per day at 1100 + and 3.5 pounds per day at about 1350 pounds. Weaning weights, ADG or yearling weight of different breed should not be compared to one another. They should be compared on the basis of cost of producing a pound of beef when the cattle to be slaughtered are taken to their best weights.

6. Carcass cutability of beef quality varies only a small degree at equal stages of fatness and maturity. There is still some discrimination against certain shapes or even against certain color patterns.

7. F_1 hybrid cattle tend to out perform their parent breeds. Generally the greater the genetic difference between the breeds, the greater the hybrid response. Hybrid vigor and heritability vary for different traits such that for any one trait if one is high the other tends to be low. Gainability and carcass and meat traits tend to be high in heritability. Ability to thrive and reproduce tend to be high in hybrid vigor.

The important desirable traits to consider in selecting cattle for efficient beef production that extend logically from the basic points above are:

1. Consistent, high fertility
2. Small size and low feed or land cost per cow
3. Heifers with early puberty and ability to calve easily
4. Good milking qualities
5. Adapted to thrive in area
6. Sound, docile and long lived
7. High ADG and efficient feed conversion
8. Lean, muscular carcass with high cut out
9. Tender, palatable beef.

Obviously some of the desirable traits are antagonistic or conflict one with another to a high degree in some cases. However, cattle in the beef producing system can be classified according to function as either bulls, brood cows (including replacement heifers), or steers (including slaughter heifers).

The traits of prime importance for each classification are:

Bulls: 1
Brood cows: 1, 2, 3, 4, 5, and 6
Steers: 7, 8, and 9

There is very little overlap in this classification, but the antagonism remains when the sires and dams necessary to produce the steers are considered if we limit our thinking to a straightbred operation. In this case a general purpose, middle of the road approach is best. If cattle are taken to the feedlot, larger cattle are more efficient. But select for ADG not mature size.

However, since different breeds have different characteristics which tend to be highly heritable on a breed basis (selecting breeds vs. selecting individuals with a breed), crossbreeding suggests a resolution of the conflict and offers a bonus of hybrid vigor.

Since breeds which are selected because they tend to be maximum for some desired trait (such as high ADG and efficient gain) will have some undesirable trait (such as large mature cows with high maintenance costs), different breeds have to be selected for different purposes. Choose a breed so that its strong or desirable traits are utilized in a breeding plan but also so that its weak or undesirable traits are avoided.

The appropriate choice of breeds for crossbreeding and the system or way they are put in the cross to complement each other is the key.

Before considering various alternatives, let's consider a system which puts breeds together in such a way as to maximize beef production per unit of land or per unit of investment assuming complete vertical integration; i.e., an idealized situation.

First, create F_1 heifers for brood cows. Use small, fertile, adapted breeds such as Angus x Jersey or Angus x Brahman where Brahman blood is needed. Such a cross picks up the traits of the breeds and adds a hybrid vigor boost where it is most needed - in the cow. The cow has to withstand the hardships of gestation, parturition and lactation.

Second, breed this hybrid cow to a bull selected individually and by breed for two things: gainability and meatiness.

Third, sell all the calves but own them after weaning until they reach appropriate slaughter weights.

Angus-Jersey cows bred to Charolais bulls illustrate this system. At the Texas A&M University Research Center at McGregor, Jersey-Angus cows average 649 pounds while their calves weighed 479 pounds at 210 days and 681 pounds at 10 months.

This system, of course, requires that three purebreeds be maintained - two to make the heifers and one for the sire.

In the future there will be a trend toward specialized breeds and specialized breeders. Middle of the road, general purpose cattle will not be competitive with the special purpose cattle. There will be breeds designed to be brood cows and breeds designed to be sire lines and selected that way.

There will be more beef breeders in the business of producing F_1 heifers for commercial producers. I think there is opportunity as never before in beef cattle breeding, but it must be specialized.

A beef producer has a number of practical considerations which favor utilizing his present cows for any system he chooses even if he contemplates a rather sharp change in his system.

The following recommendations for various types of base herds going into crossbreeding appear to me to be logical based on research and experience. In some cases

personal judgement was used. Keep in mind that the choice of a breed of sire to put on a cow must be made based on the purpose intended for the calves produced. Suggested slaughter weights listed for several crosses are approximations based on Texas research to illustrate the point. Optimum weights may vary according to local production conditions and markets.

Angus type cows

Brahman sires (Don't breed to Angus heifers)
Excellent hybrid vigor
Heifer calves - Keep or sell as F_1 brood cows
Bull calves - Steer, own until slaughter, Short feed

Charolais sires (Don't breed to Angus heifers)
Good hybrid vigor
Heifer calves - Slaughter, own until slaughter, short feed'
Bull calves - Steer, own until slaughter

Brown Swiss sires
Good hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows to produce very heavy weaning calves
Bull calves - Steer, own until slaughter

Santa Gertrudis sires
Very good hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows
Bull calves - Steer, own until slaughter

Jersey sires (Not often a logical choice)
Good hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows
Bull calves - Sell at weaning

Brahman type cows (including heifers)

Hereford sires
Excellent hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows
Bull calves - Steer, own until slaughter, 1050 pounds

Angus sires
Excellent hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows
Bull calves - Steer, own until slaughter

Charolais sires
Excellent hybrid vigor
Heifer calves - Slaughter, own until slaughter
Bull calves - Steer, own until slaughter

Brown Swiss
Excellent hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows
Bull calves - Steer, own until slaughter

Santa Gertrudis sires (Use under conditions hard even for bulls)
Fair hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows
Bull calves - Probably sell at weaning

Jersey sires
Excellent hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows
Bull calves - Sell at weaning

Brahman x British F_1 or
Brahman - British mixed crosses

Charolais sires
Very good hybrid vigor
Heifer calves - Slaughter, own until slaughter
Bull calves - Steer, own until slaughter, 1100 pounds

Brown Swiss sires
Very good hybrid vigor
Heifer calves - Sell for slaughter, own until slaughter or
Keep or sell for brood cows
Bull calves - Steer, own until slaughter, 1050 pounds

Santa Gertrudis sires
Fair hybrid vigor
Heifer calves - Sell for slaughter to keep or sell for brood cows
Bull calves - Steer, own until slaughter. If percent Brahman is one-half or less, 1050 pounds

Jersey type cows

Brahman sires
Excellent hybrid vigor
Heifer calves - Keep or sell as F_1 brood cows
Bull calves - Sell at weaning or short feed

Angus sires
Good hybrid vigor
Heifer calves - Keep or sell as F_1 brood cows
Bull calves - Sell at weaning or short feed

Charolais sires (Caution on heifers - avoid use of double muscled Charolais)
Very good hybrid vigor
Heifer calves - Slaughter, own until slaughter, short feed
Bull calves - Steers, own until slaughter, 1000 pounds

Hereford type cows

Brahman sires (Don't breed to Hereford heifers)
Excellent hybrid vigor
Heifer calves - Keep or sell as F_1 brood cows
Bull calves - Steer, own until slaughter, 1050 pounds

Charolais sires (Don't breed to Hereford heifers)
Good hybrid vigor
Heifer calves - Slaughter, own until slaughter, 850 pounds
Bull calves - Steer, own until slaughter, 1050 pounds

Brown Swiss sires
Good hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows to produce very heavy weaning calves or slaughter, own until slaughter, short feed
Bull calves - Steer, own until slaughter, 1000 pounds

Santa Gertrudis sires
Very good hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows or slaughter, own until slaughter, 850 pounds
Bull calves - Steer, own until slaughter, 1075 pounds

Holstein type cows

Brahman sires (Don't use on heifers)
Excellent hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows for hard conditions and heavy weaners
Bull calves - Steer, own until slaughter

Hereford sires (Don't use on heifers)
Good hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows to produce heavy calves
Bull calves - Steer, own until slaughter

Angus sires
Good hybrid vigor
Heifer calves - Keep or sell for F_1 brood cows to produce heavy calves
Bull calves - Steer, own until slaughter

There are other choices of sires that might be more logical for a particular situation. The examples illustrated are intended to stress, among other things, that the intended use of the resulting calf must be considered to logically choose the breed of sire.

Systematic crossbreeding properly designed, produces slaughter cattle that tend toward minimum TDN required to produce a pound of beef. Not only are specialized strains necessary, but to work on a large scale in industry, wide adjustments are needed and, I believe, will come. Three major adjustments are:

1. Specialized breeders of purebreds for use in crossbreeding. About one-half of our cattle must be purebreds to produce hybrid cattle.

2. Specialized breeders to produce F_1's for cow herds. These F_1's should and do bring a premium.

3. Vertical and horizontal integration in some form. Producers retaining ownership of a substantial number of their cattle through the feedlot will have an early substantial influence.

Several new developments are not yet quite clear as to their future but are still substantial enough to consider without making definite projections.

One development is multiple births. Oklahoma has revived this idea with some success. They have been able to get, by use of PMS injections, about one-half of their cows to have either twins, triplets, quads' or quints'. Livability and control is a real problem. If these difficultues can be worked out, it could change breeding goals considerably. The advantage of smaller cows would change to a disadvantage and only larger cows would appear suitable. Quite a few cows may eventuall be injected for multiple births, but the percentage of total cows will probably always remain small.

Another possibility that has been around a long time is "sexed" semen but it has never been worked out. That is, semen separated so that one fraction will produce bull calves and the other fraction will produce heifer calves. This sort of fantastic idea has a real basis for hope, but there has never been any serious, well-supported, well-planned research. "Sexed" semen would make the use of AI more attractive and would give a big boost to crossbreeding. Crossbreeding would be even more advantageous. It may be easier to change or influence the sex of the calf after it arrives - the effect would be the same.

A third potential that is presently possible on a practical basis is early or light weaning of calves with good gain potential. Of one pound of TDN fed a cow only about 0.45 pound TDN is produced in milk for the calf. Lactating cows at McGregor required an average of 13.5 pounds of TDN to maintain their weight. They required only 8.0 pounds when they were dry. Except to utilize above average and seasonal grass production, it may be more efficient to put a minimum amount of milk rather than a maximum amount into a calf. I believe we will see more vertically integrated outfits in the near future that will be early weaning. Our present management and market systems are not geared up for early weaned calves and light weaned calves don't bring enough to justify them. However, as trade channels shift and adjust, light calves may become more profitable. If they do, our selection and breeding projection would have to be altered again.

Multiple births and "sexed" semen were mentioned to indicate very real possibilities of scientific breakthrough. Early or light weaning was mentioned to indicate a possible change in the production - marketing scheme. However, I am convinced that we can at present substantially add to <u>true</u>, <u>overall efficiency</u> by utilizing high gaining, performance tested sires in a logical crossbreeding program based on creating hybrid vigor and complementary breed matching. In fact such a breeding system, with follow through to the feedlot, will add more to efficiency than any other development or scientific breakthrough likely in the next few decades.

FUTURE PROTEIN SUPPLEMENTS, LIQUID AND SYNTHETIC 1/

Due to microbial action in the rumen, ruminant animals can utilize various low-quality nitrogen sources to meet their protein needs. Also, higher quality protein sources are degraded to ammonia nitrogen prior to synthesis of protein by ruminal microorganisms. Dietary protein quality is of lesser importance to ruminants than nonruminants, and inorganic nitrogen sources not useable by nonruminants can be used by ruminants to meet a portion of the total protein requirement. The major nutrient shortage in the world is that of protein. Conceivably, the future will demand more of a preformed protein sources for human and other nonruminant animal feeding. Therefore, ruminant feeders will likely employ the use of low-cost nonprotein nitrogen (NPN) and low-quality protein sources in practices to reduce costs of supplying supplemental nitrogen

The only advantage to the use of NPN in ruminant feeding is potential reduction in feed cost and lack of competition with nonruminants for protein sources. While there are these advantages, there are certain limitations to the use of NPN in ruminant feeding for high-level production. Based on existing evidence, there is an upper limit to the quantity of protein synthesized in the rumen from dietary NPN. Consequently, performance of growing animals may be reduced when excessive quantities of NPN are fed, due to limited quantities of protein synthesized in the rumen. However, older aniamsl with a comparatively lower protein requirement can more effectively utilize NPN when needed, provided other essential factors are provided in the ration. The possibility of ammonia toxicity is another problem which may limit the use of such NPN sources as urea and ammonium salts. This problem is more of a management one than a nutritional one, because animals experience ammonia toxicity only when allowed to consume excessive quantities of soluble NPN. This may result from incomplete mixing of NPN in the feed, overconsumption by starved animals, etc., which results in excessive ammonia production in the rumen and subsequent increases in blood ammonia. Another disadvantage to use of some NPN sources is that some adaptation period is required before measurable NPN utilization begins. Nevertheless, these disadvantages can be minimized through management practices, and NPN sources can be used to meet a portion of the supplemental nitrogen needs of ruminants.

There are several factors which must be provided for maximum utilization of supplemental NPN by ruminants. An adequate supply of energy is of utmost importance, since most NPN sources provide no energy and the rumen microorganisms require energy to synthesize protein from NPN. Without adequate feed supply, little or no use of NPN can be expected. Certain of the mineral elements should be supplied if adequate amounts of these are not supplied is the remainder of the total ration. Of these, sulfur, phosphorus and certain of the trace elements have been shown to improve NPN utilization relative to the use of preformed protein. Other additions to NPN rations which have shown beneficial effects include low levels of intact protein,

---

1/ Presented by Gary D. Potter, Assistant Professor, Department of Animal Science, Texas A&M University, at the Southern Regional Livestock Specialist's Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

dehydrated alfalfa meal, some fermentation by-product feeds and molasses. These, in addition to supplying energy, provide useful metabolites to the rumen microorganisms in the process of being degraded in the rumen. Preparations of urea containing supplements which minimize segregation of urea from the feed physically "synchronize" the release of ammonia and the rate of bacterial protein synthesis offer promise. In order to maintain the economic advantage of using NPN sources to supplement ruminant rations, these above mentioned factors must be provided at a cost which does not push the total cost of the supplement above that of more conventional protein sources.

The use of molasses in rations containing urea has proven beneficial from the standpoint of improving animal performance. Considerable research has shown that molasses is stimulatory to the activity of rumen microorganisms, and recent evidence indicates that this increases the quantity of protein synthesized in the rumen from dietary urea nitrogen. This has the effect of providing greater quantities of amino acids to the animal. These findings have come from experiments in which low-level additions of molasses were made to an existing adequate feed supply. Therefore, one can capitalize on the beneficial effects of molasses on NPN utilization when using various molasses-NPN supplements to provide extra nitrogen to a low protein diet.

Feeding NPN supplements based on molasses is only one method of using various NPN sources. There are certain advantages to the use of molasses based liquid supplements such as use of low cost NPN, reduced labor cost due to self feeding, supply of other soluble nutrients in a complete supplement, etc. However, these advantages must be provided at a total cost of nutrient supply and utilization that maintains an economic advantage relative to more conventional nitrogen supplements. There may also be certain disadvantages. At present, research evidence clearly shows that molasses-urea supplements can be beneficial in high energy rations. There is only limited research information available relative to utilization of these nitrogen supplements for animals on low-quality roughage diets. Several producers report very satisfactory results while others have some problems. It seems that in many instances the failure of success with molasses-urea nitrogen supplements is associated with limited feed supply. Other management difficulties such as handling and storage are often disadvantageous. Other factors such as accurate means of controlling consumption rates, additive stability and various physical properties of molasses-urea supplements are not clearly understood at present. From a nutritional standpoint, additional quantitative information is needed on the necessary conditions for optimum utilization of molasses- NPN supplements, since present knowledge of rumen function suggests that ruminants should be able to utilize NPN as supplemental nitrogen, when additional nitrogen is needed, and when all factors necessary for its utilization are provided. Feeding NPN in molasses based supplements is one method of supplying needed protein. This is not to be confused with any attempt to feed cattle totally or liquid feed, but rather offers a method of supplying NPN and some factors needed for its utilization when the major feed supply is available as standing or harvested feed.

Other means of increasing the utilization of NPN are on the horizon. Again, emphasis is being placed on ways and means of increasing the amount of protein synthesized from NPN, and minimizing losses of ingested NPN through urinary excretion. Currently, new methods of providing NPN and above mentioned factors necessary for its utilization, using energy sources cheaper than high protein feeds, are being investigated. Development of a product which promotes maximum ruminal protein synthesis from NPN and has physical properties which discourage segregation and handling problems is needed. Recent advances along these lines offer some promise. The use of expanded grain-urea products seem to encourage ruminal protein synthesis

by decreasing the rate of rumen ammonia formation and increasing the rate of rumen fermentation. These products also minimize the problems of urea segregation out of the feed. Preparation of such products are a step in the right direction. They employ the use of low-cost nitrogen sources and energy sources cheaper than protein concentrates, and combine them in a manner which encourages ruminal protein synthesis. Other related approaches to the problem of rapid conversion of many NPN sources to ammonia in the rumen are being pursued. The use of organic resins to delay the rate of rumen ammonia release looks promising as a means of developing high-NPN supplements which are less likely to produce ammonia toxicity, and a means of improving efficiency to ingested NPN utilization. Doubtlessly, similar attempts to accomplish these purposes by other means will follow. The success of providing an NPN supplement of this nature will depend on whether such a product can be produced at a cost to maintain an economic advantage over protein concentrates.

There will continue to be various sources of high-nitrogen by-products that can be used as nitrogen supplements for ruminants. Government programs which promote the production of oilseed crops will also increase the quantity of by-product meals suitable for livestock feeding. Rather new products such as guar meal and castor meal are currently being used, and other such as sunflower meal and safflour meal are becoming more available. When economics allow, and research results are favorable, these may be used as sources of supplemental nitrogen for cattle. However, with advances in the low-cost production of synthetic amino acids, which can be used to correct the imbalances these products may posses, these protein sources will likely be used in human and other nonruminant animal feeding. Consequently, the emphasis is put back on the use of inorganic nitrogen sources for ruminants.

There should be a distinction made between supplemental feeding and supplying supplemental nitrogen to cattle. There are conditions where energy is more limiting than protein, such as on short pasture. Mature ruminants have the ability to conserve much of their nitrogen on low nitrogen intake. Also, the total protein requirement for mature cattle is not terribly high. In this context one should consider use of high-energy feeds such as grain in place of expensive protein concentrates in times of feed shortage. However, when animals have adequate access to low-nitrogen feed which will not meet their nitrogen requirement, then nitrogen supplementation is essential. It is in this regard that ruminants are capable of using various sources of nonprotein nitrogen to meet their protein requirement. When research has yielded information pointing up all the factors necessary for maximum NPN utilization, future nitrogen supplementation, where needed, should center around using low-cost inorganic nitrogen sources not suitable for nonruminant use. Some developments for making this possible are on the horizon, and others will follow. Using molasses as a carrier, energy source and source of rumen stimulatory factors offers one method of supplying NPN. Such products are quite satisfactory in feedlot rations and appear favorable for cattle with adequate access to standing or harvested feed.

HOW SHOULD WE REPORT BEEF CARCASS EVALUATION DATA 1/

The immediate question that arises is what data? Beef carcass data that can be collected is extensive. Quality grade, yield grade, retail cut out, Warner-Bratzler shear, taste panel tests and various chemical analyses are examples of a myriad of beef carcass evaluation techniques.

A second series of questions arises. Why is the data being collected? How is the data to be used? Who is going to use it? A satisfactory answer to these questions will provide the tangible evidence necessary to answer the first question of "what data?".

The audiences of the Extension Livestock Specialist are varied. No one set of carcass evaluation techniques will satisfy the demands or needs of all audiences nor should they be expected to. However, some carcass data will and should be routinely collected for all audiences or clientele.

All beef carcass evaluation is directed towards overall beef cattle improvement. The course of events leading to improvement might be: first the educational approach to acquaint people with the basic concept of beef carcass evaluation. Second is the stage of participation in which industry people enter into carcass evaluation and third is the use of carcass evaluation in improvement programs. The Extension Beef Specialist should consider these steps in his planning.

The first of these is the educational approach. The educational approach should point out the need for and create a desire to actively engage in beef carcass improvement.

The second phase is actual participation. Actual participation begins with data collection. Producers may collect data as a part of their breeding program. Feeders may collect data to better evaluate their cattle purchasing and feedlot management programs. Processors and retailers can improve their purchasing and selling programs through carcass evaluation.

The third and last step is the application of carcass evaluation to an overall beef improvement program. Not only improvement of carcasses but the recognition of carcass merit as an aid to buying and selling improved beef. Carcass merit can have bargaining power. However, it will function best under the roof of entire industry participation and recognition.

The educational approach:

As stated, need and desire are essential, if industry wide carcass improvement is to be successful. The usual communication methods can be used in the educational approach. However, when possible actual carcasses should be used.

1/ Presented by C. O. Schoonover, Livestock Specialist, University of Wyoming, at the Southern Regional Livestock Specialist's Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

Carcass demonstrations are one method. Live animals viewed on foot and again in the carcass have been effective in demonstrating carcass merit and evaluation procedures.

Carcass contests are excellent providing that every effort is made to use the contest as an educational tool. Published results including all carcass measurements, viewing and explanation of the carcass on the rail are important.

Tours through packing plants and retail are helpful and participation of industry people can add to the educational approach.

Quality and quantity are descriptive of carcass merit. The presentation of carcass evaluation techniques that measure these factors are the basic tools of carcass evaluation.

The first consideration is USDA Grades, quality and yield grade. Quality grades have been with the beef industry for many years. However, not all livestock producers are familar with the grading service and how it functions on a voluntary basis. A prelude to carcass data should include a description of grading service functions.

Quality grade determination is based on several factors.

The three main factors are:

conformation
degree of marbling
maturity

Other factors are:

texture of marbling
color of lean
firmness of lean
texture of lean

Of the first three, marbling and maturity are the most important, with marbling playing a major role. The eudcational approach should include an explanation of the first three factors and particularly the relationship between marbling and maturity.

Quality of saleable meat or cutability is estimated by yield grade. Yield grade is determined by four factors:

carcass weight
fat thickness
rib eye area
kidney, pelvic and heart fat

The first three factors are measured. Interior fat, kidney, pelvic and heart fat is estimated as a percentage of carcass weight.

Explanation of how these measurements are obtained and how they affect cutability or yield grade is a vital step. The educational approach should not stop here. Each new phase of carcass evaluation should be preceeded by in-depth presentation of its principles.

Participation:

The next step is participation in carcass evaluation. This may be in carcass contests, progeny testing, herd sampling or feedlot management evaluation. Here different programs will often be necessary. Progeny testing should certainly be preceeded by performance data. Pre-slaughter data such as birth date and carcass gain are desirable in carcass contests and herd sampling but may limit participation. Participation should be geared to individual needs. Initial programs should be kept as simple and as homogeneous as possible.

Beef Improvement Programs

Participation does not necessarily result in carcass improvement. As in performance testing, data collection without analysis and application leaves much to be desired.

Carcass improvement may be generally divided into genetic ascent and environmental control. Breeding programs will of necessity be slow. Progeny testing is time consuming but a necessary tool in evaluating sires. Most carcass improvement will come through the sire. Some dam comparisons will be possible but observations will be few and variable between dams. Commercial herds can gain if all steer progeny can be evaluated. Sampling programs can also be effective.

Environmental control can be effective through management adjustment based on carcass evaluation. Many of the factors affecting carcass merit are under management control. For example, fat deposition is affected by length of feeding. It may also be affected by pre-feedlot environment and other factors.

Feedlot management programs may be quite simple. For example, a feeder might feed two groups of cattle - one to 1050 pounds and one group to 1150 pounds. The carcass data he collects might only be quality and yield grade. The first group might grade 80 percent choice, 20 percent good, 50 percent yield grade 2, 40 percent yield grade 3 and 10 percent yield grade 4. The heavier steers might grade 87 percent choice, 13 percent good, 30 percent yield grade 2, 50 percent yield grade 3 and 20 percent yield grade 4. Coupled with gain and feed consumption information the feedlot operator has ample data for decision making.

Progeny testing programs by comparison will be much more complex. The individual components of both quality and yield grade should be recorded. Pre-slaughter data such as carcass weight per day of age or yield of retail cuts per day of age should become an integral part of the data. Palatability factors become important. Warner-Bratzler shear test and taste panel test may be considered.

General data presentation:

Data presentation may be divided into several general catagories.

1. Historical data - included may be such things as owner, breed, purchase date, slaughter dates, descriptive briefs of previous environmental conditions, time on feed, in and out weights, etc. The historical data should be useful and will vary according to the program.

2. Pre-slaughter performance data - beef improvement is a matter of overall improvement. Fortunately little antagonism exists between desirable performance factors and desirable carcass factors. Performance data is

essential in progeny programs and in herd sampling programs. It should be encouraged in carcass contests and its value demonstrated in the educational approach. In essence carcass data is an extension of performance data.

3. Carcass data - in a general sense carcass data can be broken down into qualitative factors and quantitative factors. Some antagonism does exist. Carcass evaluation emphasis will change as market demand and price differentials develop. However, it is doubtful that the demand will ever shift far enough in either direction to warrant total disregard for either quality or quantity. For this reason both qualitative and quantitative factors should be considered. Beef improvement programs and selection emphasis will change as market demands change.

Data organization:

Not all programs will use the same data or will they all require the same completeness of data. In general qualitative factors should be presented together and quantitative factors reported under one section.

Carcass weight is the first factor to be reported and will be consistently used in all programs. Pre-slaughter live weight will preceed it and dressing percent follow carcass weight when used.

Quality and yield grade will follow. They may be reported only as a full grade i.e. prime, choice, good, etc. and yield grade 1, 2, 3, etc. They may be broken down into all or part of their component parts.

Other qualitative data may include Warner-Bratzler shear values and/or taste panel tests. These should follow grade and its components.

The number of other quantitative measures are quite extensive. They include, for example, such techniques as ultrasonics, photogrammetry and visual scores on the live animal. The 9, 10, 11 analytical rib, the trimmed round, the Illinois equation, the Tennessee equation and complete carcass cut out are examples of other carcass evaluation techniques. Some of these techniques duplicate measurements found in the USDA yield grade equation. Presentation of this type of data should follow yield grade and its factors.

Pre-slaughter performance data should be presented separately. Except that age in days and carcass weight per day of age should be included in the carcass data. This data may be presented after carcass weight and dressing percentage or with the quantitative data. If estimated or actual retail cut out is reported in pounds and retail cut out per day of age is reported "it" may best follow the cut out data.

Carcass contest data:

Presenting data from carcass contests is difficult. Historical data such as name and address of owner, breed, class and live placing must be shown for each animal entered. Several quality grade factors are usually shown and all yield grade components plus cutability percentage. Carcass weight per day of age is often included. In addition there may be indexes, classification data, and retail value data.

All of the data is important. Each participant should be furnished with all data and desirably the information should have wide distribution for educational purposes. Preferably all data for each animal should appear on a single page. Many reports from carcass contests have been reported crosswise on legal size paper.

Basically the presentation of contest data should follow the pattern of other carcass data presentation.

1. Historical.

2. Live and carcass weight and dressing percentage (authors note: cattle in carcass contests have different pre-slaughter environments. Transportation time and distances vary. These varying conditions cause wide fluctuation in dressing percentages).

3. Qualitative factors.

4. Quantitative factors.

5. Age and carcass weight relationships.

6. Indexes, classification data and price relationships.

7. Final placing.

Besides the data some explanation of the contest rules and regulations are desirable. Comments by the carcass judge or judges is certainly worthwhile.

Summary:

Uniform carcass data presentation will depend on uniform carcass evaluation procedures. Effort in this direction has and is being accomplished. The American Meat Science Association and the Beef Improvement Federation are both working in this direction.

Emphasis and purpose of the type of program will dictate the procedures used. Even between similar programs variation will occur. Uniformity for uniformity's sake alone is not desirable. However, all programs will use some like data. Uniformity of presentation will lead to better understanding and to wider use of this basic tool in beef improvement.

VACCINES - TYPE OF PRODUCT, FOR WHAT, HOW, AND WHEN 1/

The beef cattle industry in the United States continues to expand as evidenced by the increase in numbers of finished cattle marketed. In the decade ending in 1969, the number had increased 40 percent. During the period 1961 to 1967, the number of cows increased 23 percent. Much of this growth has occurred in the Western States, but an equally impressive growth has been taking place in the Southern States. The factors contributing to this growth are numerous, but the one of highest priority must assuredly be health and disease control.

It has repetitiously been said that the United States enjoys the highest standards of animal health in the world. On the other hand, losses to the public from diseases and parasites are estimated at $2.6 billion annually, or approximately 12 percent of the annual income from livestock and poultry, including their products. As indicated, these are estimates and as such are difficult to equate accurately with the individual species.

Although many of the cattle diseases are being researched, some of considerable economic importance are receiving only limited study. Technological advances in feeding, breeding, and management practices have contributed markedly to increased efficiency. Concurrently, some of these advances have undoubtedly contributed to the complexity of the disease problems presently confronting both breeding herds and feedlot operations.

Bovine Respiratory Diseases Are Complex

Of primary concern today are the bovine respiratory diseases. In June of 1967, the American Veterinary Medical Association sponsored a four-day symposium to assess this problem "because (1) respiratory diseases of cattle continue to be widespread and costly to cattlemen; (2) preventive measures and management practices as generally applied have not been entirely successful; (3) recognition of a number of causative or potentially causative agents has complicated understanding and control; and (4) development of a variety of immunizing agents has created a need to determine optimal methods of application".

Respiratory infections affect cattle of all ages and breeds. The fact that they tend to recur and are not readily controlled by uniformally regimented preventive or therapeutic measures makes them exceedingly costly. Equal difficulty is encountered in attempts to define them clinically and etiologically. This is particularly evident by the voluminous writings devoted to the so-called shipping fever complex. Based on present knowledge, they are categorized as: (1) those caused by viruses only; (2) those apparently precipitated by one or more viruses with secondary bacterial infections, the latter contributing to the pathological severity and damage; and (3) those caused by bacteria. Further, the causal relationship, incidence and severity are influenced by environmental factors such as stress and the ecologic conditions that influence pathogenesis of the infective agents.

1/ Presented by H. G. Geyer, Coordinator, Animal Science Programs, FES, USDA, Washington D. C., at the Southern Regional Livestock Specialist's Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

Diseases Currently Recognized

"Among the recognized viral diseases are infectious bovine rhinotracheitis (IBR); Malignant catarrhal fever (MCF): infections associated with myxoviruses (parainfluenza-3 or PI3), [reo, rhino, and adeno group]; and pneumonias due to psittacosis-lymphogranuloma-venereum (PLV) agents..[and] bovine viral diarrhea-mucosal disease (BVD-MD)..."

"Respiratory diseases of bacterial origin consist of necrotic laryngitis (associated with spherophorus necrophorus) and pneumonia caused by Pasteurella spp. Corynebacterium pyogenes and species of Hemophilus, Streptococcus, Staphlococcus, and Mycoplasma also are associated with respiratory infections, but their etiologic significance is not known."

Types of Products Available

Currently four types of products, modified live virus vaccines, inactivated vaccines, bacterins, and antiserums are available for use against bovine respiratory diseases. None of these products or other biological products may be offered for interstate trade unless they meet the standards for purity, safety, and potency set forth in the requirements of the Serum-Virus-Toxin Act administered by the Veterinary Biologics Division, Agricultural Research Service, USDA.

The following modified live virus vaccines are presently licensed as having demonstrated that they are safe and effective when used in healthy cattle in accordance with the manufacturers directions.

Infectious Bovine Rhinotracheitis Vaccine, Tissue Culture Origin (TCO), Live Virus Modified (LVM)

This product is recommended for use in non-stressed healthy cattle. Antibodies appear in the blood at approximately 10 days with maximum response at 3-4 weeks. Immunity is of long duration and may persist for the life of the animal. The efficacy has been demonstrated in over 10 years of field usage. Its use in pregnant animals may induce abortion. The virus in the vaccine is not transmissible from vaccinated animals to non-vaccinates.

Infectious Bovine Rhinotracheitis (TCO,LVM) --Parainfluenze-3 Vaccine

For use in non-stressed healthy, unexposed cattle. Antibodies appear in the blood at approximately 10 days with maximum response at 3-4 weeks. The efficacy of the PI-3 fraction has not been conclusively established, but it does not interfere with the immune response of the IBR component. Calves should be vaccinated before weaning to enable them to develop immunity to PI-3 prior to stress from weaning. Calves handled in this manner should be revaccinated after weaning with the PI-3 fraction.

Infectious Bovine Rhinotracheitis Vaccine (TCO,LVM) --Leptospira Pomona Bacterin

A combination of living and inactivated agents. They are immunologically compatible. Immunogenic response correlates with conditions where these antigens have been used independently. The Leptospiral component produces increased resistance at approximately seven days with duration of resistance for about 12 months.

Calves inoculated before weaning should be revaccinated after weaning with the Leptospiral antigen. Booster injections are recommended in breeding animals.

Bovine Virus Diarrhea -- Mucosal Disease Vaccine (TCO, LVM)

This vaccine is considered relatively safe for use under field conditions. There is some field evidence to indicate that the vaccine may precipitate adverse reactions, characterized by low morbidity and high mortality in some animals. Because of this reacion this vaccine is recommended only where the disease problem is sufficiently severe to warrant the involved risks. Some calves may carry maternal antibodies to this disease for nine months which complicates use and efficacy of the vaccine.

It should be pointed out that virtually all cattle become infected with BVD which usually results in lifetime immunity. The virus can produce abortion in the susceptible pregnant animal. Vaccination of breeding stock is recommended in healthy unstressed animals eight to nine months of age.

Bovine Virus Diarrhea -- Mucosal Disease
Vaccine (TCO, LVM) -- Leptospira Pomona Bacterin

Comments on BVD-MD are relevant to this product. The viral and bacterial fractions are compatible and elicit response comparable to each antigen used alone.

Infectious Bovine Rhinotracheitis -- Bovine Virus
Diarrhea -- Mucosal Disease Vaccine (TCO, LVM)

The potential post-vaccinal reactions described for BVD-MD are applicable to this product. Since IBR vaccine induces a high thermal response and the BVD-MD fraction induces a transient leucopenia, one could surmise that the use of this combination product would precipitate a high incidence of post-vaccinal reactions. Field evidence does not substantiate this. It does, emphasize the importance of the health status of the vaccinates if post-vaccinal problems are to be avoided.

The inactivated vaccines and bacterins are generally less effective than the living products, but do afford a greater degree of safety. Since the degree of immunity is less marked and of shorter duration, these products should be employed in a planned health program. Normally two doses at properly spaced intervals are required to elicit maximal response with a regimen of repeated doses to maintain protection.

Although two types of Pasteurella, multocida and hemolytica, organisms have long been incriminated in the shipping fever complex, much is yet to be learned of their immunogenic capabilities.

Parainfluenza-3 Vaccine -- Pasteurella Bacterin

The level of the PI-3 antibodies induced by this fraction are not yet well defined. This is equally true for the Pasteurella. The efficacy afforded depends on two or more doses, preferably given before shipment. As previously indicated, booster doses may be warranted as determined by environmental conditions and management practices. These comments are equally applicable to Hemorrhagic Septicemia Bacterin.

Mixed Bacterin Bovine Formula No. 1

Although this product has been in use for many years, there is still disagreement on its capability to induce an effective immunity to the Corynebacterium and Pasteurella components. When employed, two initial doses plus booster doses are recommended.

Other bacterins available and for which efficacy has been recognized are employed for the control of blackleg and malignant edema. Bacterins containing the organisms associated with these diseases are also available in combination with Hemorrhagic Septicemia organisms.

Antiserums

Antiserums have long been utilized for therapeutic purposes or to provide a temporary or passive immunity.

The efficacy of Corynebacterium antiserum in the control of respiratory infections is of questionable merit.

The Anti-Corynebacterium-Pasteurella Serum
and Anti-Hemorrhagic Septicemia Serum

This may be of value prophylactically, affording varying degrees of protection for 2-3 weeks. When these products are employed in stressed animals or for therapeutic purposes, increased dosage is recommended.

Antiserums should not be employed simultaneously with vaccines as the antibodies present, although of temporary duration, may interfere with the antigenic potential of the vaccine.

Cost of Biologics

Using data from the Veterinary Biologics Division, an attempt was made to evaluate the cost of the 18 most commonly employed products. During fiscal year 1968, a combined total of 428,402,854 doses were offered for sale. Manufacturers' sale price, which does not include cost of administration, was estimated at $15,732,156. Of this total, vaccines represented over 341 million doses and bacterins over 86 million doses. Ranking of the respiratory vaccines in order of doses used was as follows: 1. IBR; 2. IBR + Lepto Bacterin; 3. IBR + PI-3; 4. BVD.

Limitations of Vaccines

All too frequently the words vaccination and immunization are used synonymously. Nothing could be farther from the truth. Vaccination is merely the act of administering a vaccine. Immunization or immunity is that reaction or process intended to result in response to a vaccine. Note the word intended, for immunity is not absolute. It is a relative state influenced by the quality or nature of the vaccine or antigen and the capability of the animal to respond. No two animals will respond identically to the same antigen.

Usually 7-14 days are required for the primary response in the normal health animal. It is obvious that even greater variations could occur in a group of animals on ranch, farm, in a feedlot, or following transit. Some of the significant variables are associated with:

Vaccinating nursing calves - Levels of colostrol or passive antibodies may interfere with the development of active immunity.

Serum interference - Animals vaccinated within 2-3 weeks after receiving hyperimmune or antiserums may not develop active immunity.

Dosage of vaccine - Dosage is based on antigenic units; therefore, the recommended dose should be employed regardless of size or weight of the animal. Overdosage can be as detrimental as underdosage.

Route and site of injection - The immune of antigenic response is related to the rate of absorption. Vaccines injected into the blood stream are distributed rapidly. Those injected into muscle or beneath the skin are absorbed more slowly. Those injected into fat are pooly absorbed.

This probably represents one of the greatest areas of abuse. Frequently automatic syringes are fitted with large gauge, exceedingly short needles to speed up the vaccination process. If an intramuscular vaccine is being used, two things will likely happen -- the vaccine doesn't enter the muscle, and the vaccine will leak from the large needle hole.

Storage and handling - The modified live virus vaccines are living agents and can be inactivated by heat, light, and chemicals. They should be held under refrigeration until just prior to use. Because vaccines can deteriorate in storage, they are dated. The use of out-dated products may not only fail to induce immunity, but can also cause undesirable reactions.

Dessicated or dry vaccines must be reconstituted prior to use. Only the diluent supplied with the product should be used. The use of any other material may inactivate the antigen. Many modified live virus vaccines are highly sensitive to chemicals and disinfectants. Some are so sensitive that if they are used with syringes and needles sterilized with chemicals, the residual chemical may inactivate the vaccine in the syringe as well as that in the vial.

Combining vaccines - The combining of several vaccines can result in interference, chemical inactivation, or untoward reaction. The combination products that are on the market have been approved by the USDA, Serum-Virus Control Agency. When animals are vaccinated for more than one disease at the same time, it is important that the vaccines are compatible in order to avoid possible interference by one or more of the antigens. Manufacturers are required to conduct tests to demonstrate safety and efficacy of each product in accordance with the recommended conditions of use. Thus, it is important that they be used in compliance with the prescribed directions.

The Animals - All vaccines should be used in normal healthy animals. Age is an influencing factor -- generally the young do not respond as rapidly as older animals. The newborn acquires colostrol (maternal) antibodies from the dam. Although intended to provide a temporary (passive) immunity, they also act to counteract or block antigens that may be introduced by vaccination. This is particularly relevant to vaccinating calves while still nursing or freshly weaned. Such animals should be revaccinated whether they are to stay in the herd or go to the feedlot.

As previously indicated, not all animals respond the same to a given vaccine. Animals that did not respond or had only limited response to the initial dose

of vaccine may experience a marked secondary response to a second vaccination. This same type of response may also occur as a result of exposure to the disease providing the exposure challenge does not overpower the existing level of immunity. It must be kept in mind that these are general statements and that each disease has its own specific characteristics as depicted in the following:

INTERPRETATION OF SERIOLOGY IN DIAGNOSIS OF IBR, BVD, PI-3

	IBR	BVD	PI-3
Postvaccinate Titers	Usually do not exceed 1:16, may occasionally reach 1:32.	Not predictable may reach 1:1000.	1:32 significantly protective. May result from natural exposure.
Serum Titers from colostrum	½ dam blood titer Half - life - 3 weeks Disappear at 4 months.	May reach 1:1000 Half-life - 3-4 weeks Persist for 8 months.	Persist 3-6 months.
Titers from natural exposure	1:32-1:128 rarely higher.	Produces high titer.	1:32 same as vaccinal titers.
Miscellaneous comment	Cows aborting from IBR have high titers decrease markedly in 2 months.	Protective titers variable. 1:32 may not protect.	

Other responses or reactions - Proper care and handling of vaccines has been stressed. The protein fraction may break down in products that have not been properly refrigerated. Residual portions of vaccines that have been retained for future use may be contaminated with disease producing bacteria. In either case, use of such products may cause adverse reactions. Some animals may be hypersensitive or allergic to the preservative, vehicle, or diluent in a vaccine.

Some of the living vaccines are contraindicated in pregnant animals in that the virus may invade the fetus resulting in abortion. Where such idiosyncrasies are known, it is so stated on the product label.

Animals recently exposed and incubating a disease develop a sensitization to the disease agent. When such animals are vaccinated, the vaccine organisms incite a secondary response which can foment a full-blown disease syndrome.

It must be reiterated that vaccines are not therapeutic agents, they have no curative value. They are intended for use in normal healthy animals. To use them otherwise is to invite disaster.

Summary

There is a serious need to have more meaningful information on losses in beef cattle at both the breeding herd and feedlot level. The growing interest in preconditioning certainly is an attempt toward reducing diseases and economic losses. I concur heartily in preconditioning as a concept, providing it is broadened to include the breeding herd. Preconditioning in my opinion begins at the time of

conception, for in the end the product of this cellular union will be critically judged in the feedlot for performance and by the consumer for the qualities that stimulate satisfaction.

There are no longer universal criteria or pat answers for successful beef production. Success depends on recognizing that variables do exist and the conscientious efforts to develop and process animals that will perform efficiently within certain variables. In essence, priority criteria might be enumerated as: suitability of animals to perform under specific or local conditions; the most effective husbandry and feeding practices to complement animal performance; breeding programs that measure performance in reproduction and the feedlot, and lastly, the practices and procedures relevant to the maintenance of specific standards of health.

All of these criteria are so interrelated that it is virtually impossible to assign any order of importance. However, in regard to preconditioning, health has received much emphasis, especially the role of vaccines and disease control. Today, the word vaccine is used almost synonymously with the wonder drugs. The wonder part pertaining to the manner of use, or perhaps more appropriately said, misuse and abuse.

A biological firm invests hundreds of thousands of dollars in research and development of a vaccine. Following extensive laboratory evaluation, comprehensive tests are conducted in the field to satisfy specific Federal requirements relative to sterility, safety, potency, and efficacy. In addition, there must be adequate directions for use, including warnings, contraindications, methods for handling, storage, route of administration, et cetera. Yet, the substantive value of the technology, research, and safeguards rests finally with the competency of the user and the capability of the animal immunogenic system to respond.

CATTLE VACCINATION PROCEDURES

Disease	Biological Used	Time of Administration
Anaplasmosis	Killed vaccine	Use as directed by a veterinarian.
Anthrax	Vaccines	There are several types available. Use under the supervision of a veterinarian.
Blackleg Malignant Edema	1. Bacterin	Anytime following birth; should repeat if calves less than 3 months of age. Repeat as directed by a veterinarian.
BVD (Bovine Virus Diarrhea) BVD + MD (Mucosal Disease)	Vaccine	Consult your veterinarian since vaccine can cause abortions in pregnant animals.
Brucellosis (Bangs)	Vaccine	Vaccinate heifer calves 3-8 months of age; Use in accordance with State program.
Enterotoxemia	1. Antitoxin 2. Cl. perfringens toxoid, Type C or C and D	At birth Administer 2 injections to cows 30 days apart prior to calving.
IBR (Rednose)	Vaccine	Consult your veterinarian since vaccine can cause abortions in pregnant animals.
Leptospirosis	Bacterin	Any age--repeat annually or as recommended by your veterinarian
Parainfluenza (PI-3)	1. Killed vaccine 2. Live vaccine with IBR vaccine	Two injections three weeks apart As directed by a veterinarian.
Pasteurellosis (see Pneumonia)	Bacterin	Consult your veterinarian as several vaccinations are required to develop any protection.
Pneumonia	Bacterins	Several types available; consult your veterinarian.
Redwater	Bacterin	Vaccinate as directed by a veterinarian.
Salmonellosis	Bacterin	Use as directed by a veterinarian.
Tetanus	Toxoid & antitoxin	Consult your veterinarian.
Vibriosis	Bacterin	As directed by a veterinarian after diagnosis.
Combination products		As directed by your veterinarian

GRUB CONTROL - METHODS AND STRESSES INVOLVED 1/

Investigations beginning in 1943 did not result in the development of a practical systemic insecticide until 1956. While this work was being pursued by workers at Kerrville, a group from Corvallis, Oregon, and several commercial companies joined in the search. Some of the organophosphates, when administered orally, were found to kill the second and third instar cattle grubs. Further research was then conducted and dermal applications were noted to produce the same results. This opened up the field of systemic insecticides as we know them today. These compounds were investigated in an effort to control the larval state of the Hypoderma lineatum and Hypoderma bovis present in the back of cattle.

One of the first steps in the control of cattle grubs was elucidation of the life cycle. Early observation of larvae present in the back led to the assumption that the adult female deposited eggs in the subcutis where they hatched into larvae and grew to maturity. Around 1890 it was observed that larvae were present not only in the subcutis but also in the spinal epidural tissue and in the wall of the esophagus. Observers then reported the presense of insect eggs on the hairs of the animals particularly on the hind limbs. Histological study of the invaded tissue reveals that the collagenous fibers became swollen and eventually lysed. Cells underwent necrosis and exudate, consisting of luekocytes and fibrin, accumulated around parasites and migratory tracts.

The eggs of both species are attached to the hair. Those of Hypoderma lineata are in rows along the hair shaft. Those of Hypoderma bovis are deposited samely. The larvae usually emerge from the egg within one week and penetrate the intact skin. The larvae of Hypoderma bovis make their way to the abdomal cavity, the thoracic cavity into the esophagus. They require about 2 1/2 months to reach the esophagus and they remain there another 2 1/2 months. Then they work upward through the back often through the spinal cord column and lodge under the skin of the back. About 30 days are required for this journey. Upon coming to rest under the skin, they cut a hole, increase rapidly in size, and 40 to 85 days later, drop as pupae onto the ground. The pupae stage may last from 4 to 10 weeks depending on temperature. Adult flies emerge from the pupae, mate, the female lay their eggs and the flies die without feeding.

It has been observed that the larvae of the Hypoderma bovis are regularly found in the spinal canal whereas those of Hypoderma lineatum are rarely found there. Therefore, it has been concluded that the majority of the side reactions due to the esophageal involvment may be attributed to the Hypoderma bovis species.

The following table shows the duration of the different stage of Warble fly development:

1/Presented by Dr. A. D. Allen, Ph.D., D.V.M., Manager, Animal Health Research, Chemagro Corporation, Kansas City, Missouri, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15,1968.

DURATION OF DEVELOPMENTAL STAGES OF HYPODERMA SPECIES

Event	Approximate Days
Egg incubation	3-4
Migration in tissue	150
Residence in esophagus	90
Residence in subcutis of back	40
Pupation in 50°-60°F.	35
Adult longevity	1-25

The first means of control was using Rotenone powder applied to the back to kill the larvae when they cut holes through the skin. Rotenone is recommended for use as a dust, as a spray, or wash. The organophosphate compounds were developed during the late 1930's and 1940's and were introduced as insecticides by German scientists. All of the systemic insecticides presently on the market for grub control are organophosphate compounds. The preliminary method of action of these compounds is the inhibition of cholinesterase. This is an enzyme required for the life processes. Compounds have been developed that have a wide range of safety to the host animal while they are quite lethal to the migrating larvae. Several different compounds are available on the market at the present time for this use. Ruelene, a product of Dow Chemical, is available as a pour-on in either the 25E or 8R formulations, both formulations are sold as a concentrate with water added to them and are applied to the animal at the rate of 1 ounce/100 pounds of body weight. Trolene may also be used which again is a Dow product, as a 14-day feed additive, however, it does not enjoy a wide usage in the market at the present time. Much research was done earlier on Trolene boluses.

CO-RAL (Coumaphos) a product of Chemagro is available for use as a cattle grub systemic and may be used as a 25 percent wettable powder in a spray or in a dip. CO-RAL Emulsifiable Concentrate may be mixed with water and used as a spray. CO-RAL is also available as a 4 percent Pour-on being applied at the rate of 1/2 ounce/100 pounds of body weight. Another product on the market at the present time is NEGUVON (trichlorfon) marketed by Chemagro which is available as an 30 percent soluble powder for use as a spray. This is made into a 1 percent concentration and the animals are sprayed with giving very effective systemic grub control. NEGUVON is also available as an 8 percent Pour-on again using 1/2 ounce/100 pounds of body weight. A new product that has recently come on the market which is available under the name of Warbex (famphur) marketed by American Cyanamid. This is used as a pour-on. This is the first year, 1968, of marketing this product. Other experimental compounds are now becoming available. TIGUVON (fenthion) Chemagro will soon be available on the market place, will be marketed as a spray concentrate for use as a 2.5 spray to control cattle grubs, will be available as a water miscible 15 ppm. in the water for cattle grub control.

Occasionally if these animals are treated at a time when the larvae are in the esophagus or perhaps in the spinal column to a much lesser extent. Some post-treatment signs may be observed. These clinical symptoms are not the result of direct action of the insecticide on the host animal but the result of dead and dying grubs. For example, in tests of toxicity CO-RAL and NEGUVON have both beed used at 4 and 6 times the recommended dosages to animals without any organic Phosphate toxicity symptoms being developed.

Occasionally an adverse reaction occurs when an animal is treated at the time it is harboring grub larvae in close proximity to the esophagus or spinal column. These signs are sometimes confused with the mammalian toxicity that can result from

a massive over dose of organophosphate compounds. Before therapeutic measures are issued in the wake of these posttreatment symptoms, it is extremely important that an accurate differential diagnosis be made between the snydromes of cholinergic toxicity and the reaction of the host to the dead parasite. The most frequently observed signs that are produced by side reaction due to dead parasites, in the instance of the Hypoderma lineatum, is the pathologic lesions of the esophagus (swelling of the left jugular furrow, gastric tumpanites and a frothy type of salivation). Dysphagia in varying severity is associated with animals which tend to expectorate partially masticated feed. When Hypoderma bovis are killed in the area of the spinal cord or spinal epidural tissue where a spinal nerve and its branches emerge from the spinal canal, the result is sometimes partial or complete paraplegia to the area supplied by the effective nerves. Clinical symptoms resulting from a reaction of a host to dead grubs are transitory and in most cases disappear within 96 hours.

The use of atropine sulfate for the treatment of organophosphate toxicity is well established. However, the use of atropine sulfate is contraindicated when animals are experiencing a reaction to the dead grub. When gastric tympanites result from a swollen esophagus, the use of atropine sulfate and its effect of slowing rumen motility only agrivates the condition. In these cases, a treatment of choice is the use of an anti-inflammatory preparation such as cordicosteroid and the use of proteolytic enzymes by intramuscular injection. A type of treatment that gives good results under most instances is moving the cattle about during the early stages of host-parasite grub reaction except of course in the case of paralyzed animals. This tends to have as good an effect on the prognosis of the condition as any other type of treatment that may be instigated.

INTERNAL PARASITE TREATMENTS AND CONTROL 1/

Over the past year and a half, a magic word has entered the language of the beef cattle producer, feeder, shipper, veterinarian and specialist who are vitally interested in the food producing situation in this country. That magic word is "preconditioning". It has conjured up visions of some formula that will make sure that there are no more losses of cattle or money in the processes of shipping young livestock around the country.

According to the statistician, we are part of a world-wide population explosion (3000 more people on earth this morning) and all these mouths need to be fed. The prevention of shipment losses in cattle will mean a better chance that all those mouths will be fed.

We do need to clarify some points and the first point is what is meant by "preconditioning". To each and every one, this meaning or definition is likely to

1/Presented by D. E. Cooperrider, D.V.M., Department of Veterinary Pathology, University of Florida, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

be different. At a recent committee meeting on this subject, one man said, "All my calves are preconditioned. They are weaned." To that man anything else is extra and he is not interested.

In the report of the Committee of Infectious Diseases of Cattle at the U. S. Livestock Sanitary Association in New Orleans last month, "preconditioning" was defined as "to mean the total program of preparing cattle to withstand the stress of movement and to prevent the spread of diseases peculiar to the movement of these animals". Their report goes on to support several items that have been recommended by the National Preconditioning Coordinating Committee with regard to identification, management, disease control, etc.

It would appear that a routine recommendation for internal parasite removal is not a necessity under the presently considered procedures in preconditioning. The American Association of Bovine Practitioners has set up a "C-PH" (Certified-Preconditioned for Health) program which has certain required procedures which I shall not discuss and one optional procedure which covers this presentation. That option is "all animals affected with endo-parasites to the extent that it will affect their preformance shall be treated for same".

All remarks I present to this group are, as far as my position is concerned, applicable to those cattle being raised and merchandised in Florida. I cannot speak for animals from the mountains of Montana nor from the plains of this state (Texas). The parasites do bear the same names but management practices differ greatly, thus parasite control measures must be geared to these different management practices.

The climate of our state is varied because of the size and location. The semi-tropical conditions of central and south Florida are in contrast to the more temperate zone conditions of the north and west part of the state. The marginal and sub-marginal land of the Everglades region and the marginal swampy land of the rivers and bayheads, furnish more than ample moisture for the usual stomach worms, intestinal worms and liver flukes. In addition, the many artesian wells, which often run continuously, furnish water of just the right pH for snail growth as intermediate hosts of the liver fluke. These factors must all be considered when trying to develop a recommendation for parasite treatment and control, most especially if the animals are going to a feedlot where they will be expected to add a certain poundage per day. A digestive system carrying a heavy load of worms or a liver filled with flukes cannot function to its best advantage in digestion or food or laying on of fat.

The parasites of economic importance that are present in the internal organs and intestines of cattle will fall into four groups according to the location: The lungs (air passages), the abomasum or true stomach (stomach worms), the intestines (large and small), the liver (bile ducts).

Lung parasites (lungworms) live normally in the bronchi and smaller air passages and in small numbers cause no visible signs of illness. In large numbers they cause pneumonia and in larger numbers cause death by suffocation and pneumonia. In our area, these are only periodically a problem and animals not visibly affected will never be suspected of having the infection. Those animals going into the feedlot with a minor infection will probably never give any indication of it though they may be more susceptible to shipping pneumonias than non-infected animals.

Diagnosis of the infection in the visibly affected is confirmed microscopically by finding the larvae in fecal examinations.

The treatment is an injectable product called "Dictycide" (Cyanoacetohydrazide) and requires some retreatment of animals that do not respond to the first injection. Dosage is by weight of the animal and should be according to the manufacturer's schedule. It should not be used within two weeks of animal shipment. There has been some research on a vaccine consisting of irradiated larvae, but it is not yet approved in this country.

Abomasal parasites (stomach worms) are the ones most commonly meant when "worms" are the subject of conversation and these are divided into "large", "medium" and "small". There are several drugs or combinations that will effectively remove some or all of these species.

Copper sulfate - nicotine sulfate is one of the oldest of the ruminant anthelmintics. It has good effectivity against the large stomach worms, but is less effective against the medium and small worms. It does not greatly stress the animal in the proper dosage and could be used anytime prior to animal shipment. Dosage would have to be according to the manufacturer's recommendations.

Phenothiazine has been available for over twenty-five years and is still very effective in the removal of the large worms, but only partially effective against the medium and small worms. There are precautions to be observed with this drug. It is toxic in overdoses, can produce anemia and photosensitization with resulting stress. It should not be used within three weeks of animal shipment and dosage must be watched very closely to prevent toxicity.

Thiabendazole is a recently developed anthelmintic which is very effective against all three types of stomach worms. It has the greatest range of safety and produces the least stress. Animal shipment could be made within one week of treatment.

Piperazines are often used and their efficiency is variable against the stomach worms of cattle. They have the advantage of great safety range and produce no stress. Animal shipment could be made within one week.

The intestinal worms, the Cooperia and nodular worms are only very rarely problems in cattle and then only on specific ranches. They are not generally treated except as the stomach worm anthelmintics act upon them. The Cooperias are best removed by thiabendazole and nodular worms by nicotine sulfate and thiabendazole.

Liver flukes in our area are a real problem on those ranches where they are perpetuated by low swampy areas and snails. They do not produce much visible pathology or signs in the age of animals sold for feeders. We do not find these in the animal that is less than 6 months of age and rarely under 10 months. The life cycle is of such length that the animal will probably be in the feedlot for a short time before the life cycle reaches the adult stage and eggs are produced. The young forms growing in the body are not killed by any of the presently used flukecides and those in use are very toxic. They will shock the animal sufficiently that no weight will be added for about 30 days following treatment. If animals must be treated, they would respond much better if this treatment were accomplished in the feedlot after about 30 days there. They certainly should not be treated within 30 days of shipment. There are two drugs approved for the removal of liver flukes - hexachlorethane and hexachloraphene. Both are extremely toxic and dosages should be closely controlled. They can be mixed with either phenothiazine or thibendazole without affecting the anti-parasitic activity of either. These two flukecides are not effective against immature forms migrating through tissue so about 30 days wait is

required after removal from infected pastures. The presence of flukes should always be confirmed by fecal examination before treatment and these animals should not be treated just prior to shipment.

There are three other compounds in various stages of experimentation, not yet approved (Parbendazole, Tetramisole and Loxon), which may soon be available. Specific information on these will be available when they are approved.

Our own general recommendations are not to suggest worming as a routine part of preconditioning. A very large majority of animals will respond quicker and better to a worming if it is accomplished about 30 days after arriving at the feedlot. Of course, no animal that is heavily parasitized should be shipped immediately after treatment, but should be placed in a group for later shipment several weeks after that treatment.

EXTENSION'S ROLE IN A PRECONDITIONING PROGRAM 1/

Feeder calves arrive at the nation's feedlots in a sorry state of health. As a result, the American cattle industry suffers losses estimated at 15 to 25 dollars per head. These losses include death loss morbidity, and resulting under performance and the costs of therapeutic drugs and labor. Many fail to realize that most of the dollar loss comes from morbidity.

What is a preconditioning program? Preconditioning of cattle is limited to the producing ranchers who have feeder calves to sell. It is defined as those steps both in animal husbandry and animal health which will enable a calf to better withstand the stresses involved in weaning through its adoption to the feedlot. This must include the management of the calf during its movement from the producing ranch to its destination in a feedlot.

Many people confuse backgrounding with preconditioning. The typical backgrounding operation assembles cattle from many sources and holds the cattle until they have recovered from the diseases associated with weaning and the movement of cattle. Preconditioning is an attempt to remove the sources of the problems found in cattle arriving at either a feedlot or a backgrounding operation.

Backgrounding operations are not new. One of the most successful is the wheat pasture program carried out in many states. Here weanling calves are run until yearlings. Because of the spreading out of the cattle, many health problems found in the feedlot occur with less severity.

1/Presented by Donald R. Gill, Extension Animal Nutritionist, Oklahoma State University, Stillwater, Oklahoma, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

To design a preconditioning program, it is necessary to look at the causes of calf failure. Then and only then can an adequate program be formulated. Some of the known causes of stress are listed below:

1. Weaning. -- Weaning, in the case of some of the better herds, is a severe stress. The just weaned calf suffers from both physical and emotional stress. As much as 2/3 of its previous diet is removed at weaning. Does it seem logical to add more stress, i.e., moving and sale ring, on a calf already under severe stress? Oklahoma and Iowa research indicates the desirability of holding the calves on the producing ranch until the calf has recovered from the stress of weaning.

2. Transit time. -- Iowa data shows a direct correlation between the time in transit and the problems encountered in Iowa feedlots. Too little is known about stress in cattle; however, it is known that most any organism can adapt to stress for a period of time; however, following a continual period of severe stress, the end result is always a complete collapse of the body's defensive mechanisms.

3. Nutrition. -- Movement of cattle from the producing ranches to the feedlots frequently involves periods of starvation. While a 48 hour fast is not much to a 500 pound bovine, a 48 hour fast is of severe consequence to the microorganisms which live in a symbiotic relationship with the bovine in the rumen. Feedlots are seeing more and more cases of rumen misfunctions in newly arrived cattle.

4. Air pollution and foreign body pneumonia. -- Many cattle are moved in enclosed vans where there is little or no movement of air. The effects of the build-up of carbon dioxide, carbon monoxide, ammonia, and other gases on susceptibility to disease is unknown. Many cattle are unloaded into dusty corrals and pens. Following exposure to dust, many breaks of respiratory diseases do occur. Just weaned calves are very susceptible because they tend to mill more than other cattle.

5. Lack of resistance to disease. -- One of the causes of respiratory disease today is due to the lack of resistance to the causative organisms. Two factors make this point of more significance today than it was in years past. Good animal husbandry practices have allowed cattle to be weaned at younger ages. As a result, they do not acquire immunities before they leave the producing ranches. More calves today go through the sale ring than ever before. Years ago the sale ring sold fat cattle; today the sale ring deals in calves and yearlings. The sale ring offers exposure to disease, especially to the respiratory diseases. Little can be done about it except to say that if a calf is stressed to the point that it is susceptible to an organism, the organism is probably available at the sale ring. The feedlot in terms of exposure potential, rates equally as high.

6. Uncoordinated health program. -- Most feedlots assume that all calves arriving at the lot have to be immunized for a number of diseases, and need to be treated for internal and external parasites. They do this because they don't know what has been done to the cattle before they arrive at the lot. Typical expenditures run $3.00 a head in the lot. A coordinated health program between the producing rancher and the feedlot might eliminate part or if not all of the $3.00 expenditures.

7. Timing. -- Many drugs and vaccines are not given cattle at the optimum time to be effective. For example, the wide spread use of respiratory virus vaccines at the feedlots does not return the potential benefit that could be obtained if the same products were used on the ranch. Better immunity can be built when the vaccine is given to a non-stressed animal. Even more important is the fact that the industry is vaccinating for viruses after the cattle are exposed to the virus and in

many cases are incubating the disease. Some vaccines are best given on the ranch before weaning, others in the feedlot. Without a preconditioning program, known and effective procedures are not being followed.

There are numerous other practices which can and may be employed to reduce the stress produced in moving calves from the ranches to the feedlots. As producing ranchers and Extension find ways to insure better performance of cattle, they will be rewarded. When a rancher proves to the feedlot that his calves are worth more to the lot, he will be paid accordingly. It takes time to prove the value of any practice. The rancher should not expect to receive any premium for at least a couple of years after putting a program into effect. It takes that long to demonstrate that his product is worth more than his competitors. We should recognize that preconditioning is only an aid to efficient beef production. Thus, the total program begins in records and genetic selection and ends on the rail. Not all preconditioned calves will be worth more. What should concern Extension is that the lack of preconditioning of some herds may eliminate the economic benefits which should have resulted from good breeding and management. Preconditioning is simply a quality control program in beef production. Quality control in any industry probably does not pay, simply the lack of it costs in terms of its future market and market price.

The need for preconditioning varies, no two herds probably will need the same program. Common sense animal husbandry practices along with the right animal health aids will prevail in time. Those who can't keep up will fall by the wayside. Our responsibility is simply that of providing information. Information based on sound research and tempered with good common sense. I doubt that we need to promote preconditioning; ours is simply the task of providing the facts, they speak for themselves.

WHAT ARE THE PROBLEMS OF PRECONDITIONING FROM THE RANCHER'S OR FARMER'S VIEWPOINT 1/

You have asked me to play the role of the rancher or farmer and express my views on the problems of preconditioning. However, you didn't tell me what type of rancher or farmer I was. Let me assure you there are several different kinds.

Since the average cow herd size in the Southeastern part of the U. S. is less than 30 head, the first cow-calf producer I am going to impersonate is one that has between 10 and 20 cows. Now, I can be a farmer that has a few acres of grass on my farm where I can run cattle. I plant a little sudan or millet for summer pasture and I put up baled or ensiled forage for winter. It is possible that I am a farmer that just couldn't make a living for my family so I took a part-time job. Or I can be a white-collar worker or part-timer that leases, buys, or inherits a little grass and I moonlight my cattle operation. In many instances I have had a farm background, but not necessarily.

1/Presented by Dixon D. Hubbard, Extension Animal Scientist, Federal Extension Service, USDA, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

My facilities for working cattle most usually are very inadequate and I don't have enough time and help so I frequently don't castrate or dehorn my calves. I don't treat for external or internal parasites nor immunize my cattle against disease. I run my bull with my cows year round; thus, I have all ages and sizes of calves that are sold in groups of from 2 to 5 at various times of the year. I don't performance test and I don't pregnancy test my cows or fertility test my bull. Some of my cows calve every 10 months and some every 15 months, but I can't tell you which ones. I paid $150 for my bull and I take pride in the fact that I can salvage him for $300. I don't react to normal economic principles because my cow herd remains the same whether prices are high or low.

You as Extension specialists know me and have wondered how I can do such a poor job of management and stay in business. But I don't keep any records and don't intend to start. So it can't be as bad as you say it is. I operate on an accumulation basis and I accumulate a little money in my cow herd that I would have already spent if I didn't have it in my cows. Also, I can sell a calf whenever I need a little money for taxes, Christmas, car payments, etc.

You have tried to teach me that improving all phases of my management would make me more money, but you haven't convinced me. Now, are you going to try and sell me on the idea of preconditioning? I doubt it, because you know me too well. However, I am the major contributor to the shipping fever problem. I am the one that sells the little bunches of cattle that are put together by traders over a period of several days or weeks before they are shipped to the feedlot or stocker operations in the West or Midwest. The ones that really get sick. However, if you go to the feedlots in the West, you will find that the kind of cattle that I produce make up the vast majority of the cattle being fed in that area. There is a good demand for my cattle. They perform good in the feedlot because they are long-age, light weight cattle that make compensatory gain. In fact, they frequently out perform the better kind of cattle you say I should be producing. The feeders know this, and they are paying me more for my cattle than in the past. In fact, they frequently pay me enough per pound that I get nearly as many total dollars for my long-age, light weight calves as better producers get for their younger heavy weight calves. Also, the feeders know that they can buy my calves for a slightly lower investment and get them to choice grade sooner because they're older. Thus, they have less interest on their money and they can put more cattle through their lots in a year's time.

You ask me what my problems are with preconditioning. I don't have any. I am just not going to precondition. That is I am not going to precondition the way you define preconditioning. However, my cattle are conditioned. They have survived. Have you ever considered that maybe as many if not more feeders like this type of preconditioning as they do the one where calves have been properly managed and given every thing except the kitchen sink. I think if you will check this out thoroughly, you'll find that under present conditions the combination of cost of cattle in the lot, cost of gain, and value when finished favors my kind of cattle, in spite of the health problem they cause. They are still a good buy when they are healed and are on full feed. If they are not a good deal, then why has the demand for them increased? Why do feeders come back and buy them year after year at higher and higher prices instead of filling their lots with better quality cattle.

Economists don't understand how I stay in business, but I am here and will be for some time to come. Cattle are not my major source of income, but I want to have a few cows. Oh, I would like to get a little more money for my calves, but

not bad enough to change. Thus, I am willing to sell at the going price and really gentlemen, when you have a willing buyer and a willing seller, you've traded a horse.

I have been playing the role of one type of calf producer and maybe I have slightly over-played my part. There are different gradations of this type of producer and I am sure all of the 10 to 20 cow herds are not managed as poorly as I have depicted. However, this is an area where selling the idea of preconditioning will probably have some real rough sledding.

The next alternative that should be considered is, what is the opportunities of by-passing this producer and preconditioning "put together" cattle before shipment to feeding and growing areas. Because of scale of operations, Western area feeders have to deal with volume movements of cattle from all sources and must necessarily use "put together" cattle rather than strings of fresh calves from the same genetic and environmental background. This means that under present conditions, preconditioning to be an effective management tool, must lower losses and be economical for animals from this source.

Regarding preconditioning of so-called "put together" calves, I have some data that was presented at the Preconditioning Seminar at Oklahoma State last year which are rather damaging to preconditioning these cattle. In these studies, mixed and crossbred calves were purchased at Austin, Texas, and divided at random into direct shipped and preconditioned groups. The calves for preconditioning were sent to Lake Jackson, Texas, for a period of 37 days to 41 days. The direct shipped calves went to California. The two groups of calves were fed similar rations. Feed commodities differed; however, nutrient contest of the rations, including protein and mineral constituents as well as energy, were calculated to be the same.

Table 1 shows the design of the investigation. Note that the average total length of time on feed, including the preconditioning period was 199.3 days. Direct shipped was 196.3 days. Thus, there was no real difference in the time required to get the cattle to market condition.

TABLE 1. Preconditioning of Calves, Design

	Control - direct shipment				Preconditioned			
	Rep 1	Rep 2	Rep 3	Avg.	Rep 4	Rep 5	Rep 6	Avg.
Number head	100	100	99		98	96	98	
Days fed, avg.	200	200	189	196.3	166	161	156	161.0
Init. wt., avg.	387	377	396		467	437	455	
								199.3[a]
Preconditioning period, days	0	0	0		37	37	41	

[a] Average time including preconditioning.

The data in Table 2 shows that the direct shipped controls converted slightly better than the preconditioned calves, but gained less per day. However as indicated in Table 1, there was no real difference in total time between the groups.

TABLE 2. Effect of Preconditioning on ADG, Feed Consumption and Feed Conversion

Item	Control - direct shipment				Preconditioning			
	Rep 1	Rep 2	Rep 3	Avg.	Rep 4	Rep 5	Rep 6	Avg.
First Period								
No. days	76	75	69	73.3	74	71	66	70.3
ADG	2.09	1.77	1.79	1.88	2.39	2.08	2.14	2.20
Feed consumption, pounds	14.1	12.7	12.4	13.07	15.4	15.7	15.2	15.43
Feed conversion ratio : 1	6.71	7.13	6.89	6.91	6.41	7.51	7.07	6.99
Cumulative								
ADG	2.57	2.44	2.53	2.51	2.74	2.65	2.67	2.69
Feed consumption, pounds	16.9	16.0	16.9	16.60	18.3	18.6	17.9	18.26
Feed conversion ratio : 1	6.56	6.54	6.65	6.58	6.66	6.99	6.67	6.77

Table 3 shows that although the preconditioned groups had appreciably less loss through death and consignment ("chronics") than the control, the cost of feed was slightly higher and the freight costs were considerably higher. The freight differential involved in shipping the calves for preconditioning to the East and back again Westward, accounts for most of the higher overall costs in the preconditioned groups. Had the preconditioning been accomplished at some point west of Austin, it would have improved the economics of preconditioning.

TABLE 3. Effect of Death Loss, Consigned Animals and Economics

Item	Control - direct shipment				Preconditioned			
	Rep 1	Rep 2	Rep 3	Avg.	Rep 4	Rep 5	Rep 6	Avg.
Death loss	0	2	2	1.33	1	1	0	0.68
Number consigned	3	3	6	4.00	0	2	0	0.68
Dead + consigned	3	5	8	5.33	1	3	0	1.32
Dead + consigned, %				5.35				1.37
Costs:								
Freight, avg.	8.99	8.75	9.08	8.94	12.37	11.53	12.03	11.98
Total cost/pound gain, ¢	23.81	24.04	24.43	24.09	24.79	25.57	25.20	25.18
Feeding cost/pound gain, ¢	19.94	19.89	20.30	20.59	20.21	21.27	20.37	20.61

Similar results were obtained when this trial was duplicated. In the second trial, the cumulative costs of gain were lower for the direct shipped controls than for the preconditioned calves, $22.45 vs $23.63. This was despite a 44 percent increase in loss for death and consignment in the control groups.

These experiments are not conclusive evidence that preconditioning "put together" cattle cannot be profitable; however, they do question the feasibility of this practice.

The next type of producer I will discuss is the contemporary cattleman. This individual is so named because he is the most recent arrival in the cattle business.

He comes from all walks of life including doctors, lawyers, businessmen, retirees, and politicians. He owns land and cattle for a multiplicity of reasons, most of which yield indirect economic benefits. These indirect economic returns include such things as: land appreciation, recreation, business entertainment, capital gains, and other tax benefits. Also, there are the social benefits of privacy, security, family participation and the prestige of being a cattleman and landowner.

There is little doubt that this type of cattleman will become more numerous and will account for a greater share of the nation's beef production in the future than in the past. This creates a real paradox, in that, they will have an even more important effect on cattle prices, but their decisions will not be affected greatly by price. Also, they have a stronger competitive position than other cattlemen because they are well diversified. Thus, they can spread their costs over a wide range of enterprises, many of which are far removed from the cattle business.

The wealthier members frequently become hobby breeders, but there are also those that own commercial cow herds and produce stocker and feeder calves. These calves will ultimately be shipped somewhere for stockering and/or finishing. Thus, they are part of the population of calves that fall within the scope of preconditioning.

Now as a contemporary cattleman, you have asked me what are the problems of preconditioning from my point of view.

Well, I really don't have any. My cattle are vaccinated, dehorned, and castrated. The buyer seems to be satisfied with them. He pays me a price I am willing to take. It might not be enough if I had to make a living from my cattle. However, this isn't the case. In fact, it may be an overall economic advantage to me if my cattle lose some money. In other words, I am not necessarily in the cattle business to make money raising cattle. Also, I haven't given much consideration to the effect I may be having on the welfare of the beef industry. I am more concerned about how the beef industry will serve my needs.

Under these conditions, preconditioning may not be very appealing. I am not saying some of these producers will not precondition their calves. Some of them are preformance testing and have made some major contributions to the beef cattle industry. However, what line of reasoning would you use in selling these producers on preconditioning? Based on your present knowledge of preconditioning, could you make it appealing to him to the extent that he would be willing to sacrifice some of his indirect economic benefits because of the economic advantages of preconditioning? Or would you appeal to his benevolent nature by showing him that by preconditioning his cattle he would be contributing to the good of the beef industry and future posterity of our nation.

Well, personally, I don't think we know the advantages or disadvantages of preconditioning for the contemporary cattleman. Thus, I don't know what the potential is to get him to precondition to a greater extent than he already is.

The last class of producers that I would like to discuss is those that receive most of their income from beef production. They frequently have been in the cattle business most the their lives and may have inherited their holdings. Another possibility is that they purchased their holdings with capital obtained through ventures other than producing cattle. Or possibly they started from scratch and worked their way into the cattle business. How they got into the business is not

important. The significant point is that they derive the major portion of their living from the cattle business. These are the cattlemen who are in the business to make money and must make money to survive. Basically, they are the ones that are interested in improving efficiency of beef production and this is what we are really trying to do by preconditioning cattle.

Now as this type of cattleman, I am probably vaccinating against blackleg, malignant edema and leptospirosis. If IBR, BVD, or other diseases are a problem in my area, I am probably vaccinating against these also. I brand and castrate my calves and if I don't use polled bulls, I dehorn. If I hold over some yearlings, I give them a second shot of blackleg and malignant edema. In most cases, I am trying to control external and internal parasites and I may be pregnancy testing my cows and fertility testing my bulls. Also, I may be performance testing my herd. I have found that these things are necessary to maximize profits from my cowherd. All this could be classified as automatic preconditioning. Perhaps in my case a record of my management practices is all that will be needed to verify what I am doing to the satisfaction of the feeder buyer.

Now you are asking me to wean prior to shipment, treat for grubs if I haven't already, and vaccinate for shipping fever and other infectious disease that I haven't already vaccinated for. It's not much of a problem for me to vaccinate and treat for grubs; however, preweaning is not so easy. But I will do this if I can see some compensation for doing so, either to my own direct benefit or through an increase in sale price. In fact, there is very little I wouldn't do in the way of preconditioning, if it's necessary to maintain a competitive position in the feeder cattle market. However, there is some risk involved in preconditioning, and I am not going to voluntarily do it unless someone will pay for it or it will improve my efficiency enough to pay for itself.

According to research presented by Jack Algeo at the Preconditioning Seminar at Oklahoma State last fall, it's going to cost me from $8 to $12 per head to precondition calves for short (30 days) periods. This data is shown in Table 4.

TABLE 4. Economic Aspects of Preconditioning Calves on the Ranch

		Preconditioning Period	
		30 days	90 days
1.	Average investment/weaned calf	$80.00	$80.00
2.	Rancher's cost to produce/pound calf	22.85¢	22.85¢
3.	Average weaning weight/ calf pounds[a]	350	350
4.	Growing ration cost/ton (40% concentrate-60% roughage + overhead)	46.00	46.00
5.	Average daily consumption, pounds	9.90	10.97
6.	Average daily feed cost/calf	22.77¢	25.22¢
7.	Medical cost/calf	1.50	1.50
8.	Death cost/calf (at 1%)	0.80	0.80
9.	Average daily gain, pounds	1.0	1.6
10.	Interest/calf (6%/annum)	39.45¢	1.18¢
11.	Total cost/calf (including initial investment)	89.53	106.18
12.	Final sales weight/calf, pounds	380	494
13.	Final cost/pound calf to rancher	23.56¢	21.49¢
14.	Rancher's necessary premium per pound of calf sold to break even	0.71¢	-0-

[a]Weaning weights reflect no weaning stress shrink, since daily gains were calculated to allow for gain back to original weaning weight during the period succeeding weaning.

This data shows that cattle preconditioned for 30 days will gain about one pound per day. I think this is about what I could expect. On the other hand, data from Kansas shows no reduction in sick calves and no improvement of weight at 37 days for preconditioning. Either way it sure looks like it's going to cost me money. Thus, it's my opinion that someone is going to have to pay for the extra costs of short (30 days) preconditioning periods. Especially, when I am not located in an area of relatively cheap feed and have to purchase feed as well as medical supplies and pay for more labor.

One thing for sure, if there is extra costs involved in preconditioning and it's going to come out of my pocket, then I don't want any part of it. On the other hand, if it's going to make me money, and it's within the physical realm of possibility, then I would definitely be interested. The thing that is really confusing is that preconditioning has been highly publicized during the past year or so, yet there isn't any agreement on what it means. Commercial companies, educational organizations, and individuals have held informational meetings and have discussed and explained the advantages of this program. All the questions seem to have been answered except the most important one - Will it pay to precondition calves, or to buy preconditioned calves?

Paul Engler, President of the Hereford Feed Yards (20,000 head capacity), also runs a large commercial cow herd. He says as a cow-calf producer he wouldn't voluntarily precondition, and as a feeder preconditioning is a gray area, so far, as to value. John Guthrie, Past President of the American National Cattlemen's Association who operates both a feedlot and a ranch, has mixed emotions about preconditioning. As a rancher, he says he can't afford to precondition calves he raises on his ranch to go into his own feedlot. However, he would like to buy precondition calves out of the Southeast for his feedlot in California. Statements like this from men that are highly respected in both the cow-calf and feeding industries make me a little dubious about preconditioning. Especially the part of preweaning my calves. I have a ready market for my calves and until I can see where preweaning is going to increase the value of my calves enough to make it worth my while, I seriously doubt if I'll do it.

I don't know what the future of preconditioning is. However, in my case, I think it will be limited to individual agreements, long-term contracting if you will, between me and the feeder. Then we can dicker on the extras when he comes to look at my calves. This way I'll know whether or not I can afford to precondition. I don't think you can expect me to go into this program when I am at the mercy of the market. The feeder buyers are just like me. When they buy cattle they pay the minimum price necessary to get them. Thus, if I precondition and they don't pay any extra for this service, I get stuck. I am not interested in a program that shifts money out of my pocket into the feeder's pocket. If there is any advantage of preconditioning, I want my share. Another thing, I am not worried about buyer resistance forcing me to precondition my calves. There are plenty of buyers that will take them as is.

I have discussed what I consider to be the viewpoints of three different classes of cattlemen in relation to preconditioning. There are many individuals who cannot be placed into only one of these categories. Some have combined goals or reasons for being in the cattle business. However, this division provides us with a basis for analyzing the potential of preconditioning.

There has been a tremendous amount said and written about preconditioning. But about the only thing that it has revealed to me is that a lot more research is needed before this practice can be put into its proper perspective.

The disease problem facing the cattle feeding industry is a big one. Our challenge is to try and help solve this problem. To do this will require a systematic approach. Let's look, if you will, at the basic steps for problem solving.

First - agree upon the basic problem -- identify the critical factors causing the problem so that causes can be dealt with instead of symptoms;

Second - decide what can reasonably be done to solve the problem or problems in a practical way;

Third - establish and agree upon a program and procedures for carrying out; and

Fourth - organize to execute the program.

I don't believe there is any doubt that we can agree on the basic problem, and I believe we can identify the critical factors causing the problem. However, the next three basic steps in the problem solving process in the case of preconditioning haven't been solved. This will be necessary before the true value of preconditioning can be determined.

In the first place, some agreement is going to have to be reached on what preconditioning means. A product has to be identified before it can be sold. This means defining what it is, what it will do, how much it costs, and what it is worth.

All the information I have read on preconditioning pertains to getting a calf to the feedlot in a healthy condition. Is this any guarantee that he will gain rapidly and efficiently? If so, then why performance test? Are calves that don't have the genetic potential to gain as valuable as sick calves with compensatory growth? Doesn't performance testing have to be a factor for consideration in establishing the value of a preconditioned calf?

Should we be recommending that all preconditioned calves be castrated? Is this consistent with our teaching on the economics of feeding bull calves? Based on Dr. Harry Geyer's paper, can a calf producer guarantee that his calves have immunity against the diseases that he has vaccinated for? If not, which ones are ready to be turned into the lot and which ones need further immunization? Just what does it mean when someone says his cattle are preconditioned? Does this mean that these cattle will not contract any of the diseases that they have been immunized against, that they will gain faster and more efficiently, and that the end product is what the packer wants and will pay more for?

Is preconditioning all the good management practices that you have been recommending rolled up into one term? Or is it conditioning against disease and ignoring all the other important aspects of economical beef production?

Is the calf producer that does a good job of preconditioning going to be faced with the same situation as the calf producer that has done a good job of performance testing? Meaning that, in most cases he will need to feed his own cattle to capitalize on this management practice. According to Paul Engler, who I quoted

once before, this is how it will be. If so, shouldn't the calf producer be informed of this possibility?

If a calf producer equips himself to keep his calves 30 days after weaning, couldn't he just as well keep them longer? What are the economics of this management practice? If he does this, then I think it's called backgrounding and he has a new set or problems. However, I am not sure where preconditioning stops and backgrounding starts.

Well, I could go on raising questions about preconditioning for a long time. However, the point that I have tried to make is that this is a highly complex subject where we are extremely short of information to make sound practical recommendations. Thus, I think that we should be extremely careful when we deal with this subject. I would especially caution you not to allow yourself to confuse economic efficiency with biological efficiency as they relate to preconditioning. The reason for this is that preconditioning may improve the biological efficiency of feedlot calves, but at the same time it may increase the overall cost of the finishing process.

I am in complete sympathy with the desire to improve the efficiency of beef production by preconditioning calves for the feedlot. However, I feel that a program designed for this purpose must be carefully scrutinized. It also must be carefully analyzed with regard to factual information and workability, to cost in relation to benefits, and to aggregate effects on the total beef cattle industry. We cannot afford to support a program that would be deleterious to the beef industry and a discredit to our profession. Conversely, we need a program that everyone can be proud of.

. e to how it will be. ... so, shortly ... ...

As well keep their levels? What are the ... , ... the case this, then I think it's called ... , ... ems. However, I am not sure where preconditioning start and ...

I could go on raising questions about preconditioning for a long time. ... point that I have tried to make is that this is a highly complex ... extremely short of information to make sound practical recommen... , I think that we should be extremely careful when we deal with this ... uld especially caution you not to allow yourself to confuse economic ... and biological efficiency as they relate to preconditioning. The rea... is that preconditioning may improve the biological efficiency of ... es, but at the same time it may increase the overall cost of the finish...

... plete sympathy with the desire to improve the efficiency ... beef ... conditioning calves for the feedlot. However, I feel that a pro... y this purpose must be carefully scrutinized. It also ... be ... d with regard to factual information and workability, to cost ... efits, and to aggregate effects on the total beef cattle industry ... to support a program that would be deleterious to the beef industry ... t to our profession. Conversely, we need a program that ... od.

HOUSING AND EQUIPMENT FOR SWINE KEPT IN CONFINEMENT 1/

Farrowing to Marketing

While my topic concerns confinement production I would like to go on record as saying that in my opinion there are other types of production that might for some be more desirable. Also, I would like to say at the outset that there are several types of confinement facilities. I would like to have it thoroughly understood that it is not my intention to suggest that the system I will discuss is the only satisfactory system.

There are varied opinions as to what type of facilities are best for a given area. I think we would all agree that the most satisfactory would be the type that could be operated with a minimum of labor and allow maximum gains and efficient use of feed and at the same time be reasonably priced.

I would certainly agree that there is no one best system for every producer. However, after having tried several systems and observing many more systems there is one that I can recommend that has proven very satisfactory in our operation at Lubbock.

This system entails the use of comparatively small buildings and the use of slatted floors. It is true that the initial cost is a little higher for a given number of hogs than if larger buildings were used. However, the advantages to be gained in the way of sanitation, control of bacteria and overall results of efficiency will far outweigh the added costs. For details of construction and arrangement of equipment, these slides are used.

Farrowing Houses

1. The houses are 25 feet by 54 feet and constructed of asbestos board on the sides and 1 inch by 12 inches decking, tar paper and roll roofing on the roof.

2. The walls and ceilings are insulated.

3. Exhaust fans (4) are used in each house.

4. There are 18 stalls in each house.

5. Metal crates are fastened to slatted floors constructed of oak (1 1/4 inches by 6 inches) and (1 1/4 inches by 4 inches).

6. Each house is equipped with a heater and an evaporative cooler.

7. Snout cooling is used rather than cooling the entire house.

1/ Presented by T. Euel Liner, Swine Breeder, Lubbock, Texas, at Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

8. The cost of one of these buildings completely furnished is approximately $6,000.00.

Operational Details

Sows are moved into the house 2 to 3 days before farrowing and after having been thoroughly washed. The sows remain in the crate until pigs are weaned at 4 or 5 weeks of age. All sows and pigs are moved out and cleaning process started. The house is completely cleaned and disinfected and fumigated. We like to wait 3 to 7 days before re-occupying.

Needle teeth of pigs are clipped immediately after farrowing. Iron injections are given pigs at 2 to 3 days of age. Pigs are ear notched. Creep feeding of pigs begins at 1 week of age. Oral iron in small amounts is supplied in creep feeders until pigs are 4 weeks old. Sows are hand fed twice daily.

Nursery Buildings

1. Nursery buildings are 25 feet by 54 feet divided into 5 feet by 8 feet pens on either side of a four foot alley.

2. Slatted floors (1.25 inches by 6 inches slats placed 1 inch apart).

3. Solid partitions are made of oak.

4. Gates drop down instead of swinging out.

5. Pits are used underneath the slatted floors.

6. Feeders are placed in the fence line (feeding 2 pens).

7. The buildings are equipped with heaters.

8. The cost of building and all equipment is approximately $4,000.00.

Operational Details

Pigs are brought from farrowing houses to this building at 4 to 5 weeks of age and penned by litters. Pigs are fed commercial starter feed until they reach 40 to 50 pounds when ration is changed to our milo and commercial supplement ration.

Pens require no cleaning until building is depopulated when pigs reach 65 to 75 pounds. Building is then thoroughly cleaned and disinfected.

Finishing Buildings

These buildings are 36 feed by 48 feet in size with a four foot alley through the center. There are eight 6 foot by 16 feet pens on either side of the alley. The floors are slatted with 1.25 inch by 6 inch oak over a pit for collection of water and manure. We recommend 12 to 13 pigs per pen be finished in these units. The total cost of building equipped with feeders, waterers, and automatic feeding system is approximately $6,000.00.

Details of Building

1. Outside view

   a. Building is totally enclosed and constructed of asbestos board on the sides and 1 inch by 12 inches decking, tar paper, and roll roofing on the roof.

   b. Side doors from floor level of pens are raised during hot weather.

   c. Roof ventilators and side ventilators are installed for proper ventilation.

2. Pit underneath floors

   a. The pit is formed by pouring a stem on the foundation, the floor is of concrete sloping from alley way to outside of building and toward a drain.

   b. Actually there are 4 pits in the barn, 2 on either side of alley way.

3. Supports for floor

   a. A framework of 1.5 inch pipe is used to support the oak floor.

4. Floor (each pen floored separately)

   a. Use three 1 inch by 6 inch oak slats running length wise of pen and to these nail the slats crosswise of the pen (1.25 inches by 6 inch slats).

   b. Spacing of slats should be 1 inch after oak is seasoned.

5. Pen arrangement

   a. Feeder at front end next to alley and in fence line between pens.

   b. Waterer at rear end of pen next to outside wall.

   c. Partitions between pens made of oak lumber and built solid (not spaced).

   d. Retainer at rear of pens made of heavy cyclone fencing material made into panels.

6. Inside view

   a. Fogging line, .5 inch plastic, near back of pen with small nozzle over each pen.

   b. Auger through center of building with drop spouts over feeders.

   c. Four sky lights on each side in roof for winter use and covered with plywood during summer.

These buildings have been used several years and are definitely labor savers since no cleaning of any kind is required during the time hogs are in the building. They allow fast and economical gains.

Sow Confinement Unit

At a cost of $110 per sow we built two sow confinement units for 338 sows. Here are some of the dimensions and some of the features in this confinement unit:

1. This is a metal building with one inch of fiber glass insulation backed with polyethylene on the roof and on the metal side walls which come down six feet from the top. The bottom four feet is concrete.

2. The dimensions on the building are 49 feet wide and 159 feet long.

3. The building has feeding stalls where the sows can be locked in while they are eating. The building is divided into sections so that eight sows are penned in each section. Each section has eight feeding stalls with a 12 inch wide concrete feeding trough in front of it. Also, an area of four inches wide by 5.5 feet long poured in place concrete slats (with one inch slots) behind the feeding stalls. And an area behind the slats that has been dug out and filled with two feet of coarse washed sand. (This sand area is 8 feet wide). Each section is 14 feet four inches wide.

4. Each feeding stall is 20 inches wide and six feet long.

5. There is a concrete wall two feet high with a two foot opening in the center of the pen to give the sows access to the sand area. Purpose of this concrete wall is to keep the sand out of the slatted area.

6. There are two rows of pens in the building and the feeding stalls are next to the center aisle. The gates behind the sows on each row of feed stalls can be lowered or raised at one time by means of a one ton wench at the end of the building. It takes about 10 seconds to lower the gates on one side behind the sows and about three minutes to raise them. Also, if so desired the gates behind four sows can be raised at one time by hand in order to let the sows in and out without using the wench.

7. The house has a four foot high concrete wall that is six inches thick all the way around the building.

8. There are doors covering a horizontal opening four feet wide completely around the building that can be raised in the summertime to let air circulate freely through the building. These doors are raised by a wench on the outside of the building.

Listed below are some of the advantages that we have found in this sow confinement unit:

1. A savings in the amount of labor it takes to feed the sows. In our dry sow's pens, it takes three mem about 20 minutes to feed 160 sows while in the sow confinement unit it only takes one man 10 minutes to feed 160 sows.

2. Less feed is required during extremely cold weather than is required in outside units.

3. It is much easier to check the sows in this confinement unit compared to the dry lot pens. We find it convenient to walk through the house two or three times a day to check the sows.

4. The sows cannot push the feed back out of the feeding trough because of the way the front of the feeding stall is designed.

5. The man taking care of the sows doesn't mind feeding them on a day when it is snowing or raining or the wind is blowing because he is inside and is not bothered by the elements. This is something that is worth more than we think sometimes because these sows have to be fed every day regardless of the weather.

6. The manure is collected in the pit under the slats and can be disposed of by simply pulling a plug and washing the manure into a 12 inch underground sewage line that flows to a collection pit where it is pumped on to the crop land. The pit will probably have to be emptied once a year.

The biggest disadvantage we have found to this sow confinement unit is that the sand may have to be changed every two years.

We are very enthusiastic about the way this sow confinement unit is performing at this time but we feel like that it would be about another two years before we can fully evaluate the performance of this house. However, at this point we know that we are saving $5.00 a day in feed costs plus $5.00 a day that it costs us to maintain the dry lot pens. There are about 260 working days a year and at $5.00 a day this would amount to $1300 a year. The sows have to be fed 365 days a year and at $5.00 a day this would amount to $1825. This amounts to a total of $3125 per year and in six years we can have this building paid for with just the savings on these two particular items.

CONFINEMENT MANAGEMENT OF SOWS 1/

Confinement of gestating sows is here to stay. Recent advances in swine technology have rendered this system both possible and practical. In many situations, confinement is the system of choice over drylot or pasture. Sow confinement is the final stage in a total program, but should not be attempted until the other stages have been mastered. It is a fact that confinement requires a higher level of managerial skill, and a greater capital outlay, than does a pasture system. Greater efficiencies in many swine operations will depend on better management during the pre-breeding and post-breeding period. This can be accomplished in confinement.

Some of the objectives that have been responsible for changes in management

---

1/ Presented by James R. Jones, Extension Animal Husbandry Specialist, North Carolina State University, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

systems are: (1) more efficient use of labor, (2) better sanitation to control disease and, (3) closer management of the breeding herd to improve productivity. In the utilization of confinement, a more ideal environment can be maintained, less labor is required and production schedules can be more easily met. A manager can handle a greater number of sows. Internal parasites can be more easily controlled and manure handling can be mechanized. If high priced land is involved, the investment per unit of production may be less in confinement. Estrus synchronization and artificial insemination may be more easily facilitated when animals are confined.

The confinement of sows has been dependent upon the introduction of properly balanced rations. Controlled feeding to restrict weight gains on gestating sows in general, and confined gestating sows in particular, has placed a higher premium on properly balanced rations. Feed requirements and feed levels appear different for herds in confinement. In general, vitamin levels have increased, energy levels have decreased and mineral additions have become more exacting. The daily protein requirement of gestating sows is one-half pound of total protein. A pound of supplement and enough corn to maintain a medium condition are sufficient. This might be a three pound corn level per day the first two-thirds of gestation, followed by four pounds of corn per day the last third of gestation. Sows should be fed once per day. During gestation, sows should gain a minimum of 50 pounds and gilts should gain at least 75 pounds. Sows should be moved to the farrowing house a few days prior to farrowing. If constipation is a problem, a ration containing six percent molasses can be used.

The best confinement system for handling the pregnant sow probably has not been identified as yet. Sows might be run in groups or tethered. Free-stalls or feeding crates might be used. The floor could be solid concrete, partially or totally slatted. The slats might be metal, wood or concrete. The building might be environmentally controlled or open sided. However, at the present time, it looks as though a good manager can make any system work. In North Carolina, the open sided house is very popular. A shed type house with a single row of stalls, and insulation in the roof is suggested. Many sow confinement houses are partially slatted with one inch slots over a manure pit and utilize the free-stalls. North Carolina Plan Number 524 features the free-stall idea with partial slats and allots 21 square feet per sow. However, many producers will continue to use total concrete due to lower construction costs. Then too, with sows on controlled feed, manure is not the problem as it is with animals on full feed. Another advantage for solid concrete is that a boar can be turned in with sows which would not be the case on partial slats.

Some existing feeding floors that exhibit no labor-saving innovations will be utilized for sow confinement. This is because cleaning would be a minor problem since sows establish acceptable dunging patterns. Likewise, some farrowing houses with inside-outside pens might be deemed unacceptable as farrowing houses and subsequently will be utilized as confinement sow housing.

Earlier the floor space allowance was about 50 square feet per sow in pens with feeding stalls. Gradually these allowances have been reduced through the thirties to where they now approach 20 square feet per sow. Without feeding stalls where sows are fed on the floor a minimum realistic figure for confined sows, in groups of eight or more, is about 15 square feet per animal.

There have been instances of foot and leg trouble in confinement housing. Better quality concrete and better finished concrete has reduced this problem.

Optimum slot to slat ratio has helped in this regard. A four or five inch slat with a one inch slot works very well. Concrete that is intermittently wet and dry will cause hoofs to crack and split. In some cases, heavier sows have been given access to a bedded area to get them off the concrete. Limiting the feed to sows has controlled weight and reduced foot and leg problems, as has correct mineral additions to rations. Sows will need to be selected for dispositions and anatomical soundness on feet and legs. Age and social order must be considered when sows are grouped.

Inactivity in sows on confinement is a problem, and the higher the feed level the more inactive is the sow. Every sow should be observed on her feet and moving at least once per day.

Most trials comparing pasture with concrete have failed to show significant differences in reproductive performance. Sows do breed readily in confinement. If gilts fail to show estrus, normally moving them to another pen will improve the situation. Conception rate should average 80 percent or better. In hot weather, it is good to increase the number of sows exposed by eight to ten percent, but this applies in or out of confinement.

In attempting to group sows for farrowing, it is good to have a third more boars than actually needed. There appears to be a correlation between lameness and motility of semen. Therefore, it is good to assure that a boar is sound for the period two weeks prior to the beginning of the breeding season. Boars can be turned with sows on a solid concrete pen, but with partial slats it is best to provide a breeding pen. Some boars show reduced libido when confined or expected to work in tight quarters.

TEXAS SWINE EXTENSION PROGRAM 1/

The Extension swine program in Texas as in all states has the responsibility for swine production education for county agricultural agents, adults, and 4-H Club members.

Our swine production personnel is limited to one and one-fourth man years--one staff member full time and one staff member on-fourth time. The swine program is supported by other staff members such as our meats specialist, veterinarian, housing and building specialist, economic specialists, entomology specialist, 4-H specialist, and area farm management specialists. The state is divided into twelve Extension districts and the only specialist support is from the headquarters staff and district farm management specialists.

1/ Presented by Donald B. Hudman, Extension Animal Husbandman, Texas A&M University, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

Field Activities

The field activities of the Extension specialists are initiated by requests from county agricultural agents through their district agents. These requests represent approximately sixty to seventy percent of the educational programs conducted by the swine specialists. Educational meetings vary in length from one to twelve hours of instruction. In 1967 these activities included sixteen swine clinics, twenty-one short courses, and seven workshops. The field activities include multiple county short courses, 4-H educational programs, live carcass evaluations, and county planning sessions.

Litter Testing Program

A litter testing program is conducted to furnish swine producers with performance information. This program is designed to test two groups of pigs each year. Specifically, two pigs from a litter are included as an entry. These pigs are placed on official test when they average approximately sixty pounds and are terminated individually as they reach approximately two hundred-ten pounds. Gain, feed efficiency, and complete carcass data are collected and furnished to the producers. This program is supported by on-the-farm testing programs with assistance from local county agricultural agents.

Sears-Roebuck Foundation 4-H Swine Program

Approximately 120 to 125 counties are actively participating in the Sears-Roebuck Foundation 4-H Swine Program. This project is divided into spring and fall programs. Administration and funding of the program is the responsibility of the 4-H Club Office and 4-H specialist.

The county program is based on the distribution of purebred weanling gilts. It is maintained by a revolving program of redistribution of gilts from the first litter farrowed. A new boar or breeding fees for a boar are furnished each county annually by the Sears-Roebuck Foundation. Area and county contests are conducted to judge gilts and boars. Also county prizes are awarded to the 4-H members doing the best job in feeding and managing their gilt and litter.

A Sears-Roebuck Gilt Program has been in existence in Texas for about 25 years. However, the present program is scheduled to be phased out by spring 1969.

Stiles Farm Foundation

A swine program was initiated at the Stiles Farm Foundation as a demonstration under the leadership of Texas A&M's Dean of Agriculture and Board of Directors. This confinement-type operation was organized to demonstrate the use of confinement buildings and to utilize the grain sorghum grown on the farm. The swine specialists have the responsibility for providing management, feeding, breeding, and disease and sanitation programs for the swine project. Also, the responsibility of obtaining production records and costs has been delegated to swine Extension personnel.

Feeder Pig Cooperatives

In 1968 two feeder pig cooperatives have been organized in an effort to obtain higher market prices and improve the quality of feeder pigs produced in the East Texas area. These cooperatives were organized by local swine producers,

Extension personnel, and commercial feed personnel. This feeder pig program was patterned after the programs in Louisiana. The Extension personnel have the responsibility of obtaining personnel to classify the feeder pigs for the sales. This program has required the organization of training programs for county agricultural agents to acquaint them with classification procedures and modern feeder pig production.

Swine Short Course

An annual swine short course is presented by Texas A&M University in cooperation with the Texas Pork Producers Association. The state Extension personnel have the responsibility of organizing, obtaining speakers for the program, and publishing the proceedings. The Texas Pork Producers Association helps to plan the program and furnish financial support to the conduct of the program. This short course has been held on the campus as a two-day program. This year the program will be expanded and conducted at one other location in order to attract more swine producers. The results of the last year's litter testing program, current production recommendation in feeding, housing and equipment, marketing, breeding, reproduction, and carcass quality are presented at these short courses.

Swine Production Guideline

In 1967 the swine specialists prepared a State Production Guideline for county agricultural agents to use in preparation of County Swine Production Guidelines. These guidelines were prepared in the counties that swine production was a major economic commodity. The specialists have the responsibility of approving each of these guidelines before local distribution. These guidelines have served as a good reference for feeding, breeding, management, housing, marketing, disease and parasite control, and economic evaluation for the local swine producers.

Other Extension Activities

The swine Extension specialists have responsibilities in the conduct of area and state 4-H judging contests and livestock shows, major swine shows in the state, other short courses or swine programs sponsored by other institutions or swine producers, state SPF accreditation, and other swine programs of the state.

ALABAMA'S SWINE EXPANSION PROGRAM 1/

In 1965 the Extension staff in each of Alabama's 67 counties was asked to conduct a survey of swine production in their counties with particular emphasis on opportunities and feasibility of expansion. Fifty-four of the counties reported

1/ Presented by T. W. High, Jr., Extension Animal Husbandman, Auburn University, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

opportunity for substantial expansion in swine production. Thus, the Alabama Swine Expansion Program was developed to lend impetus and direction to the expected expansion.

The demonstrational approach at the county level was considered to be the soundest approach to building interest in producing hogs on a sound, practical basis. So the "on-the-farm demonstration" became the basic unit of this program.

A swine specialist was added to the State Extension staff to direct this program. He provides technical assistance and educational leadership in counties where demonstrational units are established. More specifically, his duties include:

1. Cooperation with county Extension staffs in selection of demonstrators.

2. Provide production information to cooperating farmers.

3. Routinely visit each demonstrational unit with county personnel to provide service and guidance in developing and managing the unit.

4. Conduct in-service training schools with assigned county personnel.

5. Overall coordination of the program.

A production manual and record book specifically for use by demonstrators was prepared by the specialist in charge of the program. The manual contains recommendations on feeding, breeding, general management, and facilities. Considerable thought was given to the kind of recommendations that would be followed and it was decided that management and, more specifically, facilities should be of a relatively simple, practical nature that could be utilized by both small and large producers.

Demonstrations include farrow to finish, feeder pig production, and strictly finishing operations. It is felt that a minimum of 20 sows or 500 pigs finished annually is necessary for a unit to be economically important. So these minimums were established for a demonstration.

Procedures for Establishing Demonstrations

A demonstration will be established in a county only at the request of, and through the cooperation of, the county Extension staff. Generally, procedures are as follows:

1. Selection of a demonstrator, primarily by county personnel with assistance of the State specialist. The demonstrator must be conscientious and competent and agree to cooperate fully with Extension personnel regarding production recommendations, records, etc.

2. Visit to the farm to review situation and secure information for use in planning the operation. It is not necessary for the demonstrator to have previously been a hog producer. If he is currently a producer, his facilities, breeding stock, and general management are carefully studied so that recommendations for improvements can be made.

3. Programming of the farm to determine the optimum size of the swine enterprise. State Extension farm management specialists provide valuable assistance

in this area. Available resources, labor, other enterprises, and management skill are carefully considered.

4. Final recommendations to the farmer and assistance in implementing the program and suggested procedures.

What is Expected of the Program?

The expected benefits can be summarized as follows:

1. Practical, well-managed swine units will be located in all areas of the state. These will be available for tour groups and individual producers who are looking for ideas on facilities, management, etc.

2. Increase interest in swine production in areas where alternative farm enterprises or increased income are needed.

3. Access to cost and return data from demonstration farms.

4. Opportunities for detailed studies of health and other management problems as they occur on demonstration farms.

5. Source of high-quality crossbred replacement gilts.

Progress

As of summer 1968, 84 demonstration farms in 46 counties were participating in the program. Not all were complete and operating.

Numerous tours of demonstration farms have been conducted. These visits have resulted in new demonstration farms and improved facilities and management on the farms of some visitors.

Records have just begun to be accumulated and as these data are compiled, they will be summarized and analyzed.

In our opinion, this program has made, and will continue to make a significant contribution to the overall Alabama swine program. Of course, all demonstration units have not been as successful as we would like due primarily to a lack of management skill, occasional failure to follow recommendations, and inadequate record keeping. However, most have done a good job and have generally served their intended purpose.

WHAT TYPES OF FACILITIES FOR THE SOUTHEAST SWINE PRODUCER 1/

Slotted floors are at least being considered for all swine facilities. The labor saving aspect is the greatest advantage. The total slotted floor would save most labor, but also involves the greatest capital outlay and further magnifies management problems. The partial slatted floor with about one-third of floor area slotted is a compromise between total concrete and total slats.

Farrowing units are being constructed using partial slats. Pen areas vary from four to five feet in width and from 12 to 14 feet in length. These pens can be used only for farrowing or to carry the pigs to feeder pig size. Some producers farrowing more often favor crates over completely slotted floors. One version uses seven foot slats designed to provide a solid section in the center with slotted sections in both the front and rear of the crate.

Nursery-finish combination pens are being constructed using a pen area of 10 feet by 24 feet with an 80 square foot slotted area. This pen will carry three sows and their pigs from about ten days of age and will affort space to finish up to 30 pigs. Creep panels should be used when sows and pigs are in the nursery-finish pens. When sows are removed from the pigs, crowd-panels should be used to encourage the proper utilization of the slats.

Partial slatted gestation houses are being used to confine sows. Some of these units combine the feeding-stall and loafing-stall ideas by using a 27 inch partition. However, the slatted area is available to the group of sows.

The environment of the hog can be better controlled with full roof coverage for all buildings utilizing slatted floors. It is recommended that all swine buildings be insulated in the roof. One full inch of styrofoam or a material of equal insulating capacity for the roof is suggested. Maximum cross ventilation should be available and ridge type buildings should have ridge ventilators.

Manure-pits under partial slatted floors are preferred to a slatted floor extended over a lagoon. Drafts can be better controlled and the building can be warmer. Manure can be handled as a liquid or emptied into a lagoon. The major problem with lagoons in the South is that they have consistently been too small. However, with a five foot water depth and a minimum surface area of 30 square feet per top hog capacity, satisfactory results have been obtained.

Facilities with differing designs will work, but concrete of the correct strength and properly finished will enhance the value of any facility. Good prior planning based on sound advice will certainly simplify management problems.

1/ Presented by James R. Jones, Extension Animal Husbandry Specialist, North Carolina State University, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

2/

The large commercial swine producer in the South as in other areas has turned to some system of confinement swine housing. Although expensive, there is considerable justification for this investment.

1. Reduced labor - Labor has become very critical on most farms. Good help is difficult to obtain. A man with the proper qualifications often prefers other employment. It is possible to reduce the amount of labor required when confinement is used.

2. Mechanization - Without mechanization, reduced labor is not possible. It is difficult to attain complete mechanization without confinement.

3. Automation - Confinement is necessary to obtain automation, such as efficient feed processing and handling systems.

4. Increased volume - It is possible to increase the size of a swine operation without increasing the amount of labor or land when confinement is used.

5. Environmental control - Although frequently challenged, environmental control through confinement will often result in improvement in certain performance traits, such as feed efficiency, carcass merit and more pigs weaned per litter.

6. Land productivity - Confinement of a swine operation allows more land to be used for field crops.

7. Operator comfort and convenience - This has become increasingly important, especially to attract young farmers into the hog business.

Perhaps the most justification for confinement is in the farrowing house. Actually, the main qualification for a farrowing house is that it should enable the swine producer to wean larger litters with heavier and healthier pigs. To achieve this, a farrowing house should have the following qualifications:

1. Have proper ventilation
2. Be dry
3. Be easily kept clean and as sanitary as possible
4. Be free of floor drafts
5. Be conveniently arranged
6. Have facilities for preventing the sow from mashing young pigs (farrowing stalls)

2/ Presented on the same subject by William G. Luce, Extension Livestock Specialist, Oklahoma State University, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

7. Have outlets for heat lamps

In Oklahoma we see a definite increase in enclosed farrowing houses as opposed to open shed or pole type constructions. They are more expensive to build. However, many swine producers favor them because of four main reasons.

1. Through proper ventilation the farrowing house can be kept cooler in the summer.

2. The farrowing house can be kept warmer in the winter.

3. Better fly and other insect control can be attained.

4. It is possible to fumigate the house.

As for interior design, most of them in the past have been a conventional concrete floor. These are still recommended for smaller producers. However, several of the newer ones going up have been some type of slatted floor arrangement using either steel or concrete slats. The reasons being mainly that they save cleaning labor, no bedding is required, and the farrowing crate stays drier.

Wooden slatted floor arrangements are being used too. This is one of the easiest ways to convert an old conventional farrowing house or other unused building on the farm to a slatted floor farrowing house. Often the slats are just 2 by 4's or 2 by 6's ripped in two. These type of farrowing crates work very well to leave the pigs in for a few weeks after they are weaned.

Some type of nursery is normally necessary in large commercial swine units for the transitional period from weaning until the pigs are approximately ten weeks of age and ready to go into the feeding floor. Nursery houses, similar to farrowing houses, are usually enclosed with some type of environmental control. Nursery houses can be separate units or built into combinations with the farrowing house or finishing floor. The type system used depends on the production system such as number of farrowings per year, age at weaning and individual preference.

As for feeding floors, the most popular design in Oklahoma for the newer feeding floors being constructed is a partially slatted concrete, open shed feeding floor used in conjunction with a lagoon. Many of the older conventional solid concrete floors are being converted into these type operations. To help insure that the pigs will actually deficate on the slatted portion, location of the waterers on this portion seems to help. Also, the extension of the roof line over the slatted portion helps in inclement weather.

I really feel that reduced labor is about the only real advantage. Although debatable, there are probably slight advantages of improved sanitation and slightly less space required per pig.

As for waste disposal, open lagoons (oxidation ponds) seem to be the answer in most situations. About the only problem that is observed with them is that many are not constructed large enough. Very little problem is observed if a lagoon is constructed at a volume of two cubic feet per pound of hogs expected on the feeding floor.

STATUS OF NATIONAL HOG CHOLERA ERADICATION PROGRAM 1/

By July 1, 1968 all states have moved beyond Phase I of this effort. Twelve remain in Phase II and 38 states and Puerto Rico are operating in Phase III and IV. Probably the most encouraging advances occurred in the area with the heavier swine populations. By July 1968 all of the Northcentral and Southeastern states except two were in Phases III and IV.

The ultimate measure of success of an eradication program is its effect on disease incidence. In these six years of hog cholera eradication incidence has fallen at least 80 percent from an estimated 5,000 outbreaks annually from 1960 to 1962 with only 849 outbreaks in the fiscal year 1968.

The percent of suspicious reports confirmed as hog cholera have decreased from approximately 70 percent in 1965 to 21 percent in 1968. Laboratory support continues to improve with 94 percent of all outbreaks having been confirmed with laboratory aid in 1968. Now all swine specimens sent to laboratories should be examined for hog cholera whether they are sent in for this purpose or not. Several states pursue this course and hog cholera is identified in some of these tissues although the disease was not suspected clinically.

The years 1967 and 1968 have been the transition period from hog cholera control Phase II to hog cholera eradication Phases III and IV. Historically, an upgrading in program status has lead to an apparent increase in hog cholera outbreaks. The reported increase is probably most severe in moving to Phase III as the swine owner may recoup his hog cholera losses through indemnity payments which are initiated at this point.

Hog cholera continues to be spread by traditional methods. Movement of swine and area exposure continue to account for about 48 percent of hog cholera. Although vulnerable to action such as marketing regulations and quarantine procedures, improvement in the administration of such procedures is indicated. Georgia pioneered in this area the spring of 1968 with hog cholera commonly spreading through marketing movements, Georgia imposed a statewide quarantine last April. This quarantine held for 60 days was instrumental in reducing spread. However, incidence increased partly through market spread after the quarantine was released and the quarantine was re-imposed August 1968. The latter action is less restrictive because it apparently must be held longer to be entirely effective. We should learn much from this effort. Vaccination continues to account for about 21 percent of the outbreaks. Area exposure, 21 percent; intrastate movement, 24 percent; interstate movement, 3 percent raw garbage, 7 percent; no established source, 16 percent; miscellaneous, 8 percent.

The program is lagging behind the industry established goals in 1964. The December 1967 goal of all states at least to Phase III remains to be met. We're almost a year behind schedule. Ten states must advance to reach this

---

1/ Presented by Charles N. Dobbins, Extension Veterinarian, University of Georgia, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

objective. If this goal cannot be met soon; all must re-assess our ability to eradicate hog cholera in 1969.

ARTIFICIAL INSEMINATION AND ESTRUS CONTROL 1/

Artificial insemination is the introduction of the male reproductive cells (sperm, spermatozoa) into the female reproductive tract by instruments rather than by natural service.

With certain species (mainly cattle) artificial insemination has been used effectively for genetic improvement. At present, our inability to preserve boar spermatozoa for extended periods of time blocks all attempts to incorporate the maximum advantages possible through the use of artificial insemination into practical use in the swine industry.

The primary objective of artificial insemination in swine is a more widespread use of boars with proven genetic worth. It is hoped by the use of such tools as swine evaluation stations, these animals can be identified. Another important advantage is disease control. The spread of certain diseases which are transferred from the boar to the sow upon contact can be greatly reduced. Artificial insemination will allow swine producers interested in maintaining a SPF herd to breed their sows to any boar with less danger of losing their SPF status. The boar cost of breeding intermediate to large numbers of sows could be greatly reduced. A smaller number of expensive boars will be required. With artificial insemination matings which otherwise would be difficult (size difference, etc.) can be made. The greatest disadvantage to this technique is that if AI is to be successful, good management will be required. Although semen can be purchased commercially, the time required to obtain the semen and the difficulties of arrangements to receive it would limit the advantages of commercial purchases in the Southeast. Enough experimental work has been done with swine artificial insemination to demonstrate that the techniques involved are quite simple and that the results are satisfactory. The collection from the boar, the processing of the semen and the insemination of the sow could be accomplished by most swine producers; thereby, making AI a possible do it yourself technique, which can be accomplished on each individual farm.

The simplest and most practical method of collecting from a boar is called the glove hand technique. In order to collect from a boar he must be gentle enough that one can work around him and physicilly capable of mounting either a sow in heat or an artificial or so called dummy sow. It is much more convenient to train a boar to mount the dummy sow than to try and keep a sow in heat at all times. The time required to train a boar to mount the artificial sow depends upon the boar. Most experienced breeding boars take to the mount quickly,

1/ Presented by C. W. Foley, Veterinary Physiology Department, University of Georgia, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

most mounting it the first time they are exposed to it. Other boars require some coaxing and a great deal of patience. On occasion one will find a boar that will refuse to serve a dummy sow. Young inexperienced boars may require more training time. If the boars do not appear to be interested in the mount, soak a sponge with urine from a sow in heat and fasten it to one end of the mount. This usually increases the boar's interest. Often it is helpful to pour boar urine on the mount. The main goal is to get the boar to notice the mount.

After the boar has mounted, move slowly toward him. Kneel beside the boar, and when the boar extends his penis, grasp it as close to the end as possible. Make certain the collector's hand (or glove) is warm and dry. This is very important when collecting in cold weather. Be careful to avoid pulling the hair around the sheath. If the boar is to be collected routinely the hair should be clipped. Apply steady firm pressure to the boar's penis. Firm steady pressure is all that is necessary. The penis is not rigid, so one can move it toward the collection flask without difficulty. As ejaculation starts simply catch the semen in a flask. Try to collect the semen so that it does not come into contact with the collectors hand. This will reduce bacterial contamination. Keep the semen as near the body temperature of the boar as possible. This can be done by holding the collection flask in an outer plastic container filled with warm water. Collection will take approximately 5 to 20 minutes. Normally one should receive 200 to 300 cc of semen from a mature boar. Young boars may produce no more than 50 cc.

After collection, remove the gel (jelly-like portion) of the semen by straining through cheesecloth. Be certain to keep the semen near body temperature. This can be accomplished by using a double container similar to that used during collection. Avoid exposing the semen to sunlight, dirt, etc.

Prior to insemination or storage of boar semen, the semen should be evaluated. If one is collecting a boar that has been settling sows regularly and producing good litters, one can usually assume that his semen is satisfactory. However, the semen collected should be checked for the number of sperm per cc so one can extend properly in order to breed more sows. For young boars and boars which have not been used for a period of time the semen should be checked for at least motility (movement of the sperm) and number of cells per cc (concentration).

After several collections, one should have an idea of the particular boar's semen. High quality semen should resemble milk in color. For assistance in semen evaluation, consult the local veterinarian or county extension workers. The ability to evaluate semen can soon be picked up by the swine producer.

If the semen is to be stored, it should be diluted or extended immediately following collection. Extension of the semen will also allow one to inseminate additional sows. When the semen is mixed with the extender, the extender should be at the exact temperature as the semen. For storage, initially extend the semen (one part semen to one part extender), cool slowly in the water jacket, and store at 55°to 60°F. Prior to use (either stored or otherwise) if necessary, the semen may be extended further according to the number of sperm. If the semen is to be used immediately, extend according to the number of sows to be bred.

An extender which has previously given good results for both stored and freshly extended semen is as follows:

1.3 gram glucose
1.4 gram sodium citrate
0.029 gram potassium chloride
0.15 gram sodium bicarbonate
0.3 gram streptomycin
and
0.3 gram penicillin

Add distilled water to bring volume to 100 cc. If one plans to store boar semen for extended periods of time (over six hours) add 10 percent fresh egg yolk by volume.

The extender can be made up in large quantities and frozen for further use. However, it is recommended that the extender not be kept for more than 4 to 6 weeks and that the addition of yolk be made just prior to usage.

Sows are usually inseminated with from 50 to 100 cc of semen or extended semen containing 4 to 5 billion motile sperm. It is suggested that stored semen be warmed to just below body temperature before insemination. Regular cow insemination rods may be modified by slowly heating the rod with a match and bending the end 25 to 30 degrees upward approximately 3/4 inch for the tip. This tip will aid in penetrating the sow's cervix. First place the rod in the vagina, tip pointed up, and slowly move it forward. Do not force it. After 6 to 8 inches it should stop. Then twist or turn it gently. It should move another 6 to 8 inches forward. Attach syringe with semen to the inseminating rod and inject slowly. If one meets resistance, move the rod backwards and turn slowly. Semen should flow easily from the syringe.

Heat Detection and Estrus Control

Determining if the sow is in estrus and when during estrus is the best time to breed has long been a limitation to swine artificial insemination. A sow in heat will usually stand when pressure is applied to her back. Most estrus sows will prick up their ears when pressure is applied to their back. Do not restrain the sow to breed her. Conception rates have been improved 35 percent by careful heat detection and proper handling of the sow. Surveys of commercial studies have shown that when 4,500 sows and gilts were bred artificially 3,500 conceived with a 9.4 litter average for sows and 8.45 for gilts.

Approximately 12,000 sows and gilts were bred by commercial boar studs in 1966. The percent farrowing rate for commercial studs is usually over 70 percent.

Some of the problems of heat detection could be overcome with estrus control. In order for an estrus control compound (ovulation control) to be beneficial to the swine producer, it must be dependable, not too expensive, should not decrease fertility and be suited for oral administration. A relatively new compound called ICI 33828 (MATCH, AIMIX) has been used satisfactorily by a number of swine producers and research stations. The following is a brief summary of a demonstrational experiment using this compound. First, it should be pointed out that the number of animals on trial were insufficient to draw definite conclusions. The data should only be considered to indicate trends. These trends, however, are in agreement with the findings of other researchers.

A total of 19 gilts were placed on experiment. Nine were controls and 10 received the ICI 33828 compound. Following the removal of ICI 33828 from the gilts ration the average gilt came into heat in 4.3 days. Eight of the ten settled at first service. All 9 control gilts settled at first service. When slaughtered the control gilts had an average of 11 live pigs and the treated approximately 10.

In the second experiment 24 gilts were fed 1.5 mg. ICI 33828 per 2.2 pounds of body weight for 20 days. All 24 came into heat 6 to 8 days (average 6.6 days) after withdrawal, 23 conceived at first breeding and farrowed an average litter of 8.7 pigs.

Recent research has indicated (England, Missouri) that injections of (pregnant mare serum) PMS and human chorionic gonadotrophin (HCG) in combination with ICI 33828 allows one to inseminate all sows at one given time with less attention to detail heat checks and achieve good results.

BABY PIG SCOURS - BACTERIAL OR NUTRITIONAL 1/

The "normal flora" of the intestinal tract of a hog consists of approximately 300 different organisms, most of which are capable of causing some degree of trouble if given the proper conditions. These organisms serve a useful purpose in that they stimulate the development of generalized immunity to infection and are involved in the digestive process.

Escherichia coli is the perdominant organism in the intestinal microflora and causes the disease entity known as colibacillosis. While other species of bacteria such as klebsiella, shigella, proteus, salmonella, clostridium, and vibrio are occasionally involved, 75 percent of the cases of scours in baby pigs are due to E. coli. Becuase of its improtance, colibacillosis will be discussed in some detail. However, many of the facts concerning E. coli and colibacillosis are also true of the other bacteria that can cause scours.

There are over 130 different serotypes, or strains, of Escherichia coli. Some strains are non-pathogenic and some are highly pathogenic. Non-pathogenic strains can develop into pathogenic strains. The ability of E. coli to cause scours depends upon its virulence and its ability to multiply rapidly. Virulence increases as the disease spreads from pig to pig and from litter to litter. E. coli has a generation time of 12 to 15 minutes. Thus, one bacterial cell can multiply to 1 million in 5 hours and 1 billion in 7 1/2 hours. In a normal pig, the E. coli organisms are found only in the posterior small intestine,

1/ Presented by Gordon A. MacInnis, Extension Veterinarian, Virginia Polytechnic Institute, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

caecum, and colon. In colibacillosis, they multiply rapidly, crowd out the other organisms, and appear in almost pure cultures in the stomach, anterior small intestine, heart, liver, lung, and brain, as well as in the posterior bowel. This fact is important in diagnosis. Bacteriological isolation of E. coli from the above organs before death is indicative of colibacillosis. E. coli organisms characteristically invade these tissues after death and consequently their presence at that time is meaningless.

Colibacillosis spreads rapidly from pig to pig and from litter to litter. One thousand (1,000) virulent E. coli organisms will cause the disease. A scouring pig can shed up to 100 million E. coli in each gram of feces and will expel feces at the rate of several grams every 10 to 15 minutes.

Some of the conditions which often trigger colibacillosis are chilling, no colostrum, insufficient milk, too much milk, filthy environment, anemia, and infected navels.

While very important in controlling disease, sanitation and disinfection of farrowing quarters is no guarantee that colibacillosis will not occur. E. coli organisms will be introduced into the pen by the sow. A sow will produce antibodies to the strains of E. coli to which she has been exposed for at least three weeks. These antibodies are transmitted to the pigs through the colostrum giving almost immediate but temporary immunity. There is not sufficient time for a sow to produce antibodies to new strains picked up during the last three weeks of gestation and immunity to these strains is not transmitted to the pigs through the colostrum. Consequently, these are the strains of E. coli that are most likely to cause scours.

By three weeks of age baby pigs have lost all the immunity they received through the colostrum. At this time, when the sow is milking heavily and the pigs are eating solid food, a condition known as "milk scours" occurs. This is a nutritional condition but, because of the lack of immunity, can easily become colibacillosis. At four weeks of age pigs respond to their own intestinal microflora and begin producing antibodies of their own. E. coli can again cause trouble as a result of the stress of weaning and the exposure to a new environment. This may take the form of scours or may show up as edema disease.

As is true of most infectious diseases, prevention of colibacillosis is based on elimination of sources of infection and upon increasing individual resistance. The first is accomplished by strict sanitation, by avoiding the introduction of new stock during the last half of gestation, and by altering the intestinal microflora. Individual resistance is increased by proper nutrition of sows during gestation and lactation, mixing sows at least four weeks before farrowing, the use of an autogenous bacterin, making sure pigs receive sufficient colostrum, prevention of chilling, and supplemental iron.

BABY PIG SCOUR CONTROL 1/

Diarrhea or scours is said to be the most common cause of death in baby pigs. In this country it is estimated that between 30 and 35 percent of the pigs born do not reach the market. Seven to ten million pigs in the U. S. die each year from diarrhea. A two-year English survey of 26,684 pigs showed an average death rate of 21.1 percent (5,632 pigs) from birth to 8 weeks, and 77.4 percent of that mortality was during the first week of life. Deaths after two months of age were estimated at less than 2 percent.

Changing trends in swine production, such as confinement rearing and multiple farrowing, have set the stage for what is called "herd disease level" and "bacterial disease buildup." Research studies have shown that poultry and swine reared in new buildings with new equipment made little or no response to medications. However, as the environment became more and more contaminated by use, later groups of animals made significant growth responses to medication.

Now the first line of defense in controlling scours in baby pigs is a clean environment assuming that the pig gets his share of colostrum. In order to have a clean environment, the farrowing house should be cleaned, disinfected and vacating (rested) the building for at least seven days before the sows are moved into the house. Time is important because mother nature will restore the facilities to a more or less disease-free state.

Now when the time comes to move the sows in the farrowing house, it is just as important that they be clean both internally and externally. It is best to worm sows 7 to 10 days before they farrow so the feces are free of parasite eggs. By doing this, the newborn pig can be raised free of parasites, providing there are no Strongyloides ransomi larva in the colostrum. At present, we are working on a way to control this parasite in the carrier sow. The North Carolina Parasite Control Program has outlined a very effective way of controlling the common swine parasites of the south. It is based on the fact that Strongyloides is the most common parasite of North Carolina swine. When a newborn pig ingest these larva with the colostrum, we may have a severe diarrhea in the young pigs accompanied by a mortality rate that may approach 75 percent or higher. An even greater economic loss is experienced by stunting, anemia, and unthriftiness. The larva destroys the epithelial cells of the intestine tract of the pig and a secondary E. coli infection takes place. Now unless we treat this newborn pig for the parasite problem, it is useless to use antibiotics or sulfa drugs to control the diarrhea.

The Enteritis Complex of swine is a study of many infectious diseases - bacterial, viral, and fungal. In many cases Colibacillosis (E. coli) is triggered by environmental stresses such as cold, chilling, dampness, drafts or by simply poor sanitation. In order to effectively control scours caused by these factors,

---

1/ Presented by Robert F. Behlow, Extension Veterinarian, North Carolina State University, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

we must improve our management or the environment. In addition to this it is important to choose the right antibiotics and drugs; some are effective against certain groups of organisms and totally ineffective for others. That is one reason for choosing a medication that is known to be effective against a range of bacteria that are causing the problem on that particular farm. The nitrofurans, neomycin and sulfa drugs are drugs of choice for controlling the intestinal infections; however, tylan and streptomycin are effective against the Vibria organisms.

As we learn more about the nutritional, physiological and microbial relationships in the intestine of the young pig we will uncover some basic causes of pig scours.

HOW I OPERATE MY CONFINED SWINE PROGRAM 1/

Gehlbach Pork Farms, Inc. is a family corporation consisting of Albert Gehlbach and two sons, Gerald and Donald.

Records are kept with the Illinois Farm Business Farm Management Service. We have the opportunity to compare production efficiencies of our own farm with the average of 700 other pork production farms that also belong to the service.

Our records show that in 1967, our feed costs per cwt. pork produced was $9.74, compared to $11.68 average feed cost of other farms, or an advantage of $1.94 for every cwt. of pork produced. Our average selling price per cwt. live was $19.26 or $.41 per cwt. above the average of other farms. The combined above average efficiencies in feed cost and selling price amounts to $2.35 per cwt. of pork produced or $29,600 additional income during 1967.

The average feed cost per 100 pounds pork produced for the past 10 years was $1.74 lower than the average of other farms in the service and our average 10 year selling price was $1.41 higher, which gave us an overall advantage of $3.15 per cwt. of pork produced during the past 10 years.

This data is not presented in a boastful manner as there are opportunities for much greater efficiencies on our farm, but it's these efficiency measures over a period of years that determine whether one should invest additional capital in production facilities or whether he should discontinue being a pork producer.

The size of our operation at the present is the production of 6,000 hogs per year, farrowing to market, and the growing of 260 acres of continuous corn.

1/ Presented by Albert Gehlbach, Commercial Swine Producer, Lincoln, Illinois, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

The labor force consists of two sons and myself plus one maintenance man and one other full time employee. Besides the corn and hog production we also do most of our building construction.

We farrow approximately 65 litters per month in farrowing crates on concrete slotted floors. The pigs are weaned at three to four weeks of age. They have access to self-feeders and are kept on totally slotted floors until market time.

All feed are processed on the farm using a corn-soy ration. Feed is blown to various buildings through a one inch pipe.

A cross breeding program is followed using a three breed rotation of Yorks, Hamps, and Hybrids. Major emphasis is placed on securing meaty type boars to up-grade the quality of our market hogs which are sold on a grade yield basis direct to the packer.

Our main production building consists of a three stage farrow to finish house with farrowing at one end, nursery in the middle section and finishing on the other end. The farrowing and nursery sections have gas unit heaters to maintain proper temperature. The entire building has concrete slotted floors. Evaporative coolers are used for summer cooling and also serve as the total ventilation system.

A seven and one-half acre lagoon serves as the major waste disposal system. Some of the more solid material is hauled or pumped to the field once or twice per year as fertilizer for corn production.

We are mostly on a gilt program; keeping only about 25 percent of first litter gilts for a second litter. Pen breeding is done on concrete floors with animals having access to permanent open-front housing. They are self-fed 12 hours out of 72. After animals are bred they are moved to gestation house having partial slotted floors with limited feeding on floor.

All gilt pigs are ear notched for age and litter quality. All gilt pigs from a litter that shows any trace of a heritable defect are given a special negative notch to avoid using them for breeding purposes.

Confinement has been the answer to many of our production problems. Pigs are under less stress and are more easily observed. Any treatment that may be necessary can easily be given. Confinement; however, is not a substitute for good management.

WHAT THE NATIONAL PORK COUNCIL OFFERS THE SWINE INDUSTRY 1/

The question, What Has The National Pork Producers Council to Offer The Pork Industry?, has probably been asked of every person who has approached his neighbor, his marketing agency, or processing organization about becoming active in the goals of the organization. The most direct answer I can give to that question is...PROFITS TO THE PORK INDUSTRY. The entire list of goals of the N. P.P.C. are made for that one reason only...Profits to the Producer, Profits to the Market Agencies, Profits to the Processors, Profits to the Retailers, and Profits to the consumer in the way of high quality products which the consumer feels are worth the money he or she payed for them. These segments of the pork industry, as well as those allied businesses and individuals must realize a profit. Otherwise the Pork Industry will cease to exist.

That answer to the basic question as to what we have to offer is greatly over simplified. The many individual questions that arise can also be summarized in How Do You Get The Job Done?

First of all, the N.P.P.C. offers ENTHUSIASM in the Pork Industry. Let us recall that fifteen years ago, the pork industry could have very well passed out of the picture without too many tears. The housewife said she didn't want to cook with lard, the housewife said she didn't want to wash her kids or do her laundry in soap...she said she wanted detergents. The housewife said she wasn't getting enough meat for the money she spent for pork. Farmers producing pork could have thrown in the towel and changed their farming operations to produce some other products. But, there were a few of us in the country that said, "We aren't completely out of the picture, yet." We decided we were going to do something about the whole situation. We went to work. We bred off the lard. We increased the size of the loin eyes and hams our pigs produced. But we knew if we did not let people who consume our products know about this it wouldn't mean a thing.

We watched some of our fellow livestock producers who wore wide brimmed hats and high heel boots. We watched these fellows as they walked down the streets with a swagger that indicated they had the world in the palm of their hands. They had ENTHUSIASM. Admittedly, a great segment of the pork industry did not.

We of the Pork Industry do have that attitude now. Our accomplishments in the past ten years have been outstanding. We know that we have a long way to go, but no longer are we the outcasts of a community. Now, through our nation wide pork industry organization called the National Pork Producers Council, we are beginning to do a bit of swaggering down the street. We producers are businessmen. We can control the input and the output of our industry through voluntary cooperation. Our products are becoming accepted. Not as much as we would like, but we've now got the enthusiasm to do something about this problem too.

1/ Presented by Albert Gehlbach, Commercial Swine Producer, Lincoln, Illinois, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

A second thing the National Pork Producers Council has to offer is LEADERSHIP. We are developing leadership by getting producers active in their own communities...in their counties...in their states...and at the national level also. We are developing producers who can speak for the industry, and when you have leadership in producers, this just naturally develops leadership in marketing agencies, in processing organizations, and in the retail portion of our business, also.

This leadership in turn develops a DIRECTION in which the pork industry should go. And this is the main purpose of the National Pork Producers Council. What direction should we go? Through extensive questioning of not only producers who are members of the NPPC, but producers who are not, we feel we know what producers need in order to make their producing business more profitable. For example, there is no secret that we have many problems out on the farms in the way of Swine Health. Producers, through their answers to questions, tell us they want more research in the area of the Mastitis-Metretis Agalactia Complex. They want more research in the area of TGE, and more research in the area of Baby Pig Scours. There are other areas producers tell us need attention, but these are the three most mentioned ones. In other words, the researchers in universities and colleges are able to listen to the needs of the pork producers through The National Pork Producers Council.

Pork producers are telling us other things, too. They want to know the relationship of quality to consumer acceptance of the finished product. They want to know the causes of prenatal mortality; they want to know how to control the odor and the economics of different housing systems. Producers want to know how to better relate the live hog price to the actual carcass value; they want to know the relationship of the size of a cut of pork to the consumer acceptance of the product.

Pork producers now have a place to make their needs known. Through being actively engaged in county, state and the national organization, swine producers at last have a voice in the direction their industry should go.

But, the profits are not in the industry for anyone until the consumer finally buys the product from the meat counters all over the nation. And, this is the next area in which the National Pork Producers is active... merchandising and marketing.

The NPPC hired what we feel are the best brains in the nation to find out why the consumer was not more favorable toward pork. Once again, we can say we now know where we are. Basically, the consumer likes the taste of pork. The consumer likes the aroma of cooking pork. The consumer likes the flavor of pork. But, from days in the past, we have left over some old time ideas about pork. The consumer has some doubts about the digestability. They think it is fat. They think there is something wrong with pork if it is not cooked enough, and as a result, they over cook and lose much of the appeal which pork has. Housewives are not exactly sure their guests would care for pork, so they do not serve it when they have a dinner party...unless it is already processed...such as ham.... One important item we found through our market research...the retailer makes more money per pork carcass as compared to other meats. We hope to make it possible for him to sell more of them.

All of us in the pork industry had some suspicions that these things existed in the consumer's mind, but through the effort of our NPPC...NOW WE KNOW...and now we can find out what to do about the marketing and merchandising of our product.

Just where are we? Well, we're organized in 23 states in which pork is produced. These 23 state organizations are an important part of the N.P.P.C. Because of the efforts of producers in these 23 states, some 361 marketing agencies are cooperating by sending five cents per head of market hogs to the N.P.P.C. This happens because of the voluntary request of the producer. One cent of that nickel goes to the National Livestock and Meat Board to further their research and merchandising in pork. Some of that nickel goes back to the states to be used for production research, promotion, and other projects that are unique to each state. The amount that goes back to the state organizations varies state by state according to their hog numbers and needs.

The funds that go to the N.P.P.C. will never overlap those activities being carried on by the individual states. They are used and will be used in areas that the states cannot and should not take on.

One of our N.P.P.C. projects is to RESEARCH THE RESEARCH. By cooperating with the Federal Extension Service, a massive project is under way in which all swine production research will be drawn together. The results and the recommendations from this research will be put in a "bible", and this vast amount of information will be available to every veterinarian, every county agricultural agent, every vocational agriculture instructor as a source available to every producer in the nation. Also, this cataloging will allow researchers throughout the country to know what has been done and what is being done, so that duplication of research will no longer be a necessity.

I mentioned before that one of the thoughts that keep preventing the consumer from buying pork as often as she would like to is the idea that there is something dangerous about pork if she doesn't know how to cook it properly. We know this as the Trichinosis problem. We know this undoubtedly has been a problem in the past, but we also know that it is not the big problem today. But, we've got to get to a point where we can say to the consumer that all pork is free of this anxiety. Through cooperation of a state university, the packing industry, and the N.P.P.C., extensive research has been done with methods that are fast and economical that will tell us which specific carcasses are infected and which are not. We want to be able to go back to those producing pork and be able to assist them in completely doing away with this problem. Indications are that this will be possible in the not too far distant future. Being able to tell the consumer that this problem no longer exists will be one of the biggest steps forward for the entire pork industry.

As a result of the extensive survey of the ideas the consumer has about pork, the N.P.P.C., in cooperation with the American Meat Institute, and the National Livestock and Meat Board, is about to see what can be done with the ideas consumers already have. We're going to try to change the IMAGE of pork. Details are being worked out now. Test market campaigns will be conducted, with research before and after, that will tell us whether we can move more fresh pork to the consumers tables. This will tell us if we can get rid of some of those "old wives tales" that are continually spread about pork. The N.P.P.C. is offering and will lend the leadership to such a market test...and when it is completed, it is available to all of the processing and marketing interest in the pork industry.

I've dealt in generalities. To tell you in detail what the N.P.P.C. has to offer the pork industry would take too much time. This much I can tell you... when we started we had no way to go but up. We've come far enough by now that

we could slide backwards quite a ways. We are not going to see that happen. In the past seven months, FIVE MILLION head of hogs have contributed a nickel per head in this Nickels For Profit Program. I admit that we have a long way to go. We are going to go that long way. Because, the offer the National Pork Producer's Council makes to the entire pork industry is PROFIT.

WHAT METHOD FOR CARCASS CONTESTS 1/

The efficient production of high yielding and acceptable quality carcasses is the ultimate objective of all selection programs and should be the objective of Pork Carcass Contests. "What Method of Pork Carcass Contest?" is a challenging question and I hope I am able to present some ideas that will stimulate some thinking. However, I am unable to answer the question to my own satisfaction and I am sure I cannot to yours. I think we should always keep foremost in mind that carcass contests can never be a substitute for performance or litter testing as a tool to use in a selection program. Carcass contests provide a show, competition and advertising opportunities which producers and the public like but too often, I feel, the results are misused. Regardless of the rules or methods established a select few will always develop ways to beat the rules and methods and therefore, the carcass contest results may not be too meaningful.

Carcass contests have so many limitations or variables that dictate what can be done. The show management plays a very important role in what type or method of carcass contest that can be conducted. Some shows limit the number of entries for one or more reasons. Some require carcass exhibits, others do not. Some stipulate that results be presented on a live weight basis and this creates more problems such as, time of arrival at the show, weighing conditions, time of weighing, distances traveled, weight tolerances, etc. Some shows permit barrows and gilts, others limit the contest to only barrows.

The slaughterer probably has more to say than anyone else on "What Method of Carcass Contest?" First, a slaughterer must be available and willing to cooperate. There should be an agreement between the show and slaughterer on ownership, costs, labor, etc. relative to the conduct of the show. Communication between the show and the packer is extremely important. The packer should know exactly what, when, where and how each operation is to be conducted. This entails transportation, commission firms, weights, inspection service, cutting procedures if used, measurements, calculations, exhibits, exhibit maintenance and sales.

Other problems that determine what type of carcass contests are: (1) labor, (2) time, (3) trained personnel, (4) display facilities, (5) equipment available.

1/ Presented by G. T. King, Associate Professor, Texas A&M University, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

Carcass contests are being conducted using several methods primarily because of the reasons already discussed. Methods commonly used for ranking carcasses are as follows:

1. Yield of lean cuts as a percentage of live weight (one or both sides cut).

2. Yield of lean cuts as a percentage of the carcass weight (one or both sides cut).

3. Yield of ham as a percentage of carcass weight.

4. Yield of ham and loin as a percentage of carcass weight.

5. Yield of primal cuts as a percentage of carcass weight (4 lean cuts plus the bellies).

6. Ham-loin index.

7. Ham index.

8. Dollar value/cwt. of carcass calculated from pricing each cut (cutting one or both sides).

9. Dollar value/cwt. live weight calculated from cutting test of carcass.

10. Estimated yield of lean cuts from backfat thickness and carcass grade.

11. Pounds of lean cuts per day of age.

With this brief discussion of problems and methods currently encountered in conducting pork carcass contests, let us now consider what are some of the basic fundamentals of a contest.

1. Establish minimum and maximum standards or requirements for eligibility. This serves two purposes, a carcass sifting operation and saves time, labor, etc. for a more efficient contest.

2. All data collected should be objective whenever possible.

3. Results should be educational and meaningful especially to the producer.

Now let us consider what the minimum and maximum requirements should be to qualify entries. Since the swine industry was the first to approve an all-breed carcass certification program which has been followed for several years these requirements should be met for eligibility in a carcass contest. However, I would like to point out that the carcass length disqualification is primarily to comply with certification and not a lack of carcass desirability. I believe a minimum dressing percentage of 70 percent should be a requirement. I, also, believe a minimum combined quality score of 2 on a 5 point scale should be a minimum for eligibility. I would concur with the National Barrow Show, Austin, Minnesota in requiring a minimum skinned ham yield of 14.0 percent.

The only subjective measurement in the requirements set forth is that of combined quality score. This should be done by the judge or judges until research has given us a better objective measure that is fast and reliable.

In these maximum and minimum requirements set forth there are questions on the reliability of: (1) age (2) weight for age (3) litter size marketed (4) dressing percent and (5) loineye measurement. Most of these can be verified if entries are purebred or of purebred parents and recorded with the breed associations. However, all data provided is only as reliable as the integrity of the individual involved and thatwe must accept unless evidence to the contrary is submitted.'

The "Method of Carcass Contest" I would propose at this time, based upon recorded research and personal observations, would include the following data and methods:

1. Nominate, identify and enter for a specified contest at 56 days of age.

2. Separate contest for barrows and gilts. Disqualify late castrates, cryptorchids or monorchids.

3. Require entries to meet all certification requirements.

4. Code tattoo all carcasses.

5. Require a minimum dressing percentage of 70 percent after a 36 hour chill.

6. Require a minimum combined quality score of 2 (1-5 scale) for marbling, firmness and color scored by the judge (American Meat Science Association).

7. Use a single judge system and require that he supervise all measurements, weighing and calculations.

8. Require that both sides be cut according to the American Meat Science Association recommendations.

9. Require the loineye tracing be made at the 10th rib from the untrimmed loin.

10. Require a minimum ham yield of 14.0 percent of chilled carcass weight.

11. Judge will rank carcasses on yield of ham and loin as a percentage of chilled carcass weight with a quality score of 3 or better.

There is no method that is applicable to all contests because of the reasons already pointed out. There will have to be compromises primarily due to facilities and educational exhibits. However, a great deal more can be done educationally through the use of other media and by using selected individuals to emphasize certain characteristics. I believe the educational empahsis should be directed toward the consumer in the areas of consumer identification of cuts, cookery, buying, utilization of cuts and changing the image of pork rather than to the producer. I do not want to infer that producers already know all the answers, neither do college professors, scientists and Extension personnel.

There is certainly ample evidence that we are not all of the same mind with respect to pork carcass contests. We should be open minded and willing to accept and put into practice new techniques as they become available through research. An example is that of determining age through eye lens nitrogen determination. When a rapid technique for determination is developed this can be used to obtain accurate ages for those few individuals we may question.

Let me reinterate that carcass contests should never be used as a substitute in a selection program for performance testing that is done under controlled conditions. I wish I could answer the question "What Method of Carcass Contest?" to my own satisfaction and to that of yours.

NEW MARKET HOG AND FEEDER PIG GRADES 1/

During the past 15 years, the swine industry has made tremendous progress in producing market hogs with more lean and less fat. To keep pace with this progress, the USDA revised the standards for grades of barrow and gilt carcasses effective April 1, 1968, and the standards for grades of slaughter barrows and gilts effective July 1, 1968.

The grades for pork carcasses are based on two general considerations: (1) quality-indicating characteristics of the lean and (2) expected combined yields of the four lean cuts.

The standards provide two general levels of quality: one for carcasses with acceptable lean quality and another for carcasses with unacceptable lean quality.

Carcasses with unacceptable lean quality or those with bellies too thin to be suitable for bacon production are graded U.S. Utility.

Carcasses with acceptable lean quality are graded U.S. No. 1, 2, 3, or 4, depending on their expected yield of the four lean cuts.

Average backfat thickness and either carcass length or weight together with an evaluation of muscling, are used as the basis for the numbered grades.

Six degrees of muscling are recognized in the standards. These degrees are intended to cover the entire range of muscling present in today's pork carcasses.

1/ Presented by Peter J. Williams, Standardization Branch, Consumer & Marketing Division USDA, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

The standards provide guidance in combining variations-from-normal muscling and fat thickness into the final grade. A variation of one full degree of muscling compensates for one-tenth inch of backfat.

The grades for slaughter barrows and gilts are closely correlated with the carcass standards. In this connection, all of the same principles and factors included in the carcass standards are also included in the slaughter barrow and gilt standards. Therefore, with a thorough understanding of the application of the carcass standards, one should have no difficulty in applying the slaughter swine standards.

(Seventeen slides illustrated the major points of the presentation.)

WHAT KIND OF HOGS WILL BE PRODUCED IN THE FUTURE 1/

When asked to gaze into the future and predict what kind of hogs will be being produced ten, twenty, or fifty years, or longer from now, is quite an undertaking. I am sure that some would expect me to draw, paint, or describe a pig that would be much different than those of today. I question if it will look much different than our better ones of today. In making any predictions, one is always at the mercy of those who did not know something could be done and do it.

It is true that many changes have been made. One only has to go back through history of hogs from the time he was taken from the stage of a wild creature to when he was domesticated. From this time to now, he has been molded into every possible shape, form, color and of distinctive breeds. He has been bred for more fat and less fat, with more muscle.

He has been bred to take confinement, which is a far cry from his early environment. Some breeds and also certain lines within a breed have been bred to take these hazards of civilization better than others. Most all of these accomplishments have come from selection and environment.

In most cases, a demand for more of a given part of a hog has been responsible for changes. Through wars and days before soy beans and other oil producing plants, lard was in strong demand. Modern warfare with changes in types of explosives has left lard a by-product of the hog instead of something in great demand. I question if the hog will ever play any important part in future wars or police actions other than for his protein values.

There is a need for a certain amount of fat in the world but I believe there will be an adequate amount of different types of oils and fats to take care of any demands long after the supply of proteins has been exhausted.

1/ Presented by Wilbur L. Plager, American Yorkshire Club, Inc., Lafayette, Indiana, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

The demand from hogs in the future will continue to be for more muscle or protein, with a minimum amount of fat to make pork products palatable. Any additional fat will be that which is necessary to meet requirements by the hog himself in order to convert feed economically into pork and survive the ridged stress factors of todays modern production methods and those in the making.

If you have not followed pigs closely, in recent years, the word stress may not mean much to you. Those who have followed pigs through total confinement can give you a long list of problems created by the new changes in the science of Porcinology.

My humble observation has been that when backfat has been lowered to a point of much under one inch of backfat, at 200 pounds live weight and muscle increased, stress problems increase real fast. Quality in the carcass seems to suffer at a higher rate or degree. I am sure one can take the results of many of our carcass shows and varify this. Generally, fatter people are more easy going. The same thing is possibly true in hogs. Their physical make-up is quite similar to humans in many ways. Present day requirements of stress on people has not lowered the rate of ulcers or heart attacks.

I do not think the swine industry has reached any plateau of meatiness. I do believe that some of our very top meaty hogs have reached or nearly reached this point. It is possible that a few may have gone beyond. I am sure those few animals that are double muscled will not be of any help genetically, and could be more harmful than anything. Any boar or gilt that is wound up tight and short legged, and looks more like a bull dog walking towards you, scares me. I am sure they will not help a breed or the swine industry, these same kind did not help the beef industry.

At the 1968 National Barrow Show, only three pigs out of 373 killed in the Carcass Contest had over 1.6 inches of backfat. Only fourteen had over 1.5 inches of backfat. There were only twenty who failed to have four inches of loin eye.

I am sure that standards set up by swine evaluation testing stations that have used the requirements of the Certification Program, have benefited the swine industry. This, along with on the farm testing and breeders regular certification, have played an role in recent achievements towards a more muscular pig with less fat.

The top hogs at this years N.B.S. were a little bit better in figures but did not make as much improvement as that of the overall average figures of the entire 373 hogs. This is the most important of all to me.

I believe, if all pork chops averaged four and a half inches in size, the swine industry would be in fine shape. We started out a few years ago with an average that did not beat three inches by very much. It also had a lot more fat to be trimmed from the loin. All of the rest of the hogs carcass needed plenty of trim also.

I have always felt that any pig that had an extra well muscled shoulder, had to have more muscle other places. This cut offers a real good market for fresh pork roasts; however, if it lacks muscle, it is better off in sausage or some other processed product. Some of the better cured picnics and butts have been good but too often sell at depressed prices.

Our big effort, in the future, should be to bring up the average muscling of all hogs in swine production. Figures show that the bottom end of over-fat number three hogs has been lowered a great deal but our average on the market and on the rail is still far too low. We have the breeding stock today to bring this average up to a desirable point if we will only use all our available tools and breeding stock.

Less people will raise the hogs of the future and there will be less people furnishing the breeding stock. It is quite possible that less breeds will be used. At the same time, less breeds will be used in a crossing program, with more attention being payed towards what breeds or lines and how they are used so as to produce more uniformity in our production. Those who do a better job will earn a reputation for better hogs that will make it possible to sell Reputation Hogs for more money. Roy Keppy of Davenport, Iowa, is a good example on this score. He used four breeds at one time. He has made his reputation with two breeds. He was only floundering around with four breeds, producing a good one once in awhile. Now he is producing better ones in numbers.

I like to spell MANagement with the first three letters capitalized as they are the three most important in management by all odds. No hog farm will be successful without the right kind of management regardless of all the fancy material, gadgets, buttons, that you can put together in any hog operation. Pigs will continue to have more respect for man than all of the fancy hog equipment that you can build.

No hog operation is going to be successful that has more in buildings and equipment than hogs can pay for within a reasonable time. Most of this equipment had better be figured on a ten year depreciation basis unless it is a real good permanent building. For those who are contemplating getting into the hog business in a big way, should ask themselves if they are sure that their wife's next husband will ever want to raise pigs. If, after this and a favorable answer, the second major decision should possibly be, should I rent or purchase an air hammer. So many hog houses have been remodeled so many times that the floor and sides look like that of a crazy patchwork quilt.

At one time, I probably thought I could have told you how to build a hog house. I have changed my mind so many times since those days and am more confused today than ever. One thing for sure is that I would hold the size down, of my farrowing house, and have more farrowing houses. First, for isolation and second, so after a farrowing I could give it a rest after cleaning. The rest could be more important than the job of cleaning.

Areas of the country would make a great deal of difference in some of the building plans. Up North, I am sure would use as little metal as possible. Freezing and thawing, in metal buildings, increases ones problems. One can build a certain size building for so many hogs weighing so much but a change in weight of hogs, as they grow could, with temperature changes from 100 in the shade to 30 below is something else that is hard to cope with. This can test the best in ventilation and management.

When some of these conditions take place, stress becomes a factor in setting up many diseases. The same thing takes place in crowding, drafts, no bedding with damp floors especially at younger stages of the pigs development. I have seen pigs run out of tails and ears to chew on, then take on one of the weaker ones, and eliminate him. The Humane Society would have frowned upon severl of these kind of operations that I have seen. Upkeep of these more expensive buildings is costl

Any building that is enclosed for environmental control that has slotted floors and holds the urine and waste within the building had better have better ventilation than I have seen or an oxidation ditch and paddle wheel, which costs money to buy and operate. Repairing could be an unpleasant job. Pigs can take a lot, but when stress catches up, all hell can break loose and any profit that there might have been in that group of pigs is gone, or nearly gone.

I am sure that some of these things that are tied to overall management and disease in swine are a blessing in disguise. If it were not for them, I am sure that swine production could be on the same stage with broilers and laying hens, also turkeys. In comparing broiler production to swine production, many fail to take into consideration that they are comparing an egg to a stomach that depends upon bacteria. Successful hog producers must maintain at least 51 percent favorable bacteria in the hog's system to succeed. A higher percentage will be better. Also, it is hard to compare hatching of eggs to the reproduction system in swine. Control over reproduction problems in swine is much more difficult than those in poultry. It has cost some a sizable fortune to find some of these things out and will cost others in the days and years to come. Recently, a banker called me in regard to a loan to an outfit wanting to set up a 30,000 sow unit. Very few have been able to manage a 1,000 sow operation. Not many can handle 500 sows. Yes, we need more who can do a good job with 100 sows.

I am sure that less people will be raising pigs. They will be larger operators, but they better purchase their management before they buy their breeding stock, buildings and equipment, and hope that they can keep their management. One better have his labor problems solved first, or expect to work twenty-four hours a day.

It is the little things that make such a big difference in any business. Most every business knows how to do the big things - but many fail because of the little things that make so much difference in the long run. In hog production, it is known as husbandry, a word that some would eliminate, and substitute with the word science and some push buttons. I don't believe you can do away with either of them in future hog production.

A successful hog operation of the future will not be any different when it comes to doing ALL the many things well, which have and will continue to mean the difference between success and failure.

Buildings will need to be able to save as much labor as possible in the handling of waste. Partial slotted floors or deep narrow gutters that will take the waste to an outside storage space or a lagoon offer the most for their investment. They will also save on labor.

Damp pens with drafts will only help the makers of drugs and keep the veterinarians busy and eliminate profits.

Breeding stock with more bone, more floor of chest that can increase lung capacity, will help in warding off trouble.

Pasterns that are too short and straight plus shoulders and legs that are also too straight will not take confinement as well. We like sound feet, but may have to change our ideas some on what is sound and best for a modern or future hog operation.

Quite often, the better muscled hog does not get around too well. Watch the movement of one of these kind when you get the opportunity. This better muscled breeding stock can not take as much cold weather. This may not be as big a factor in warmer climates.

It would be fine from everyone's viewpoint if we could raise hogs of all ham, big pork chops, lean bacon, and just enough fat for cooking. The viscera, hide, feet, and legs are not needed very badly after the hog reaches the killing floor. Their value is of little consequence; however, it is pretty hard to stay in business without any of them.

We all want as much muscle as possible but some other things come first. First, a producer must have a litter of pigs. They must have the will to live and grow economically. The mothering ability of the sow is not needed for as long as we used to believe necessary because of improved nutrition, but she is still an important factor until a pig reaches at least ten pounds of weight. This may be changed in the future but only with better nutrition and management.

Through artificial insemination, we have proven that we can use less but better boars in swine production. We also have the opportunity to improve hogs if AI is used to that end and not just to multiply hogs. I do question the elimination of the use of sows if we are going to produce pigs at the same rate as in the past. Some scientists may do it but doubt if it would be practical, like hatching eggs. To be in the hog business one must have pigs first. Better muscled pigs that grow and are healthy is a producers next goal.

You will see some help from fewer but better organized producers that will do a great deal in helping bring up the average quality in hog production in the future.

A better job will be forthcoming in selling our better product. Producing and not selling will not keep anyone in business today or tomorrow.

Cheaper construction and labor saving devices will be a must for swine producers to compete. More pigs farrowed and raised per litter at less cost that come near to meeting present-day demands for muscle has been proven possible. Some of these larger litters are doing better than some smaller litters. Better, larger litters will make pork more competitive. I am sure that in years to come that science, management, and breeders will make the necessary changes and improvements to keep swine competitive and the hog will continue to wear his crown as "The Mortgage Lifter".

4-H LITERATURE FOR MEMBERS AND LEADERS 1/

Four-H literature in the form of record books and manuals have been in existance since the 4-H Club program began. These manuals took many forms, but most of them were designed primarily to impart knowledge of the particular subject matter field in which the youngster was "carrying" a project. In most cases these publications were produced by subject matter specialist at the State level, who were trained in their particular discipline. The manuals were excellent resource publications, and were filled with information and fulfilled the intended purpose for which they were written. But are they sufficient today?

In recent years, knowledge about education and how youngsters learn has been greatly expanded. Four-H staff personnel recognized that many of these educational principles and concepts could be incorporated into 4-H literature. Researchers have studied the youngsters and are able to give educators a better base on which to structure their educational efforts.

With these few thoughts behind us, let us get down to the specifics of this talk. You specialists are charged with providing literature for 4-H projects which are offered to youngsters in your state. Traditionally, this material has been produced in each state for "local" consumption. In recent years; however, we have seen a trend away from this type of literature production at least in some project areas. We have seen very successful literature produced by national development committees, whereby, the materials are made available to states through the National 4-H Service Committee, either in finished form (automotive, tractor, horse, vet science) and in "camera ready" form (electric guide sheets).

Coordinated production efforts by several states, even Extension regions, have proven very efficient for some. Namely, the Pacific Northwest and the Northeast Region. We want to talk more about this later.

We on the Federal level of the Extension Service will not tell you what literature you have to use. We do believe we have some suggestions as to the procedure of production and to how the literature should be structured and to give you some guidelines in how to make it more efficient.

My primary duty in the 4-H Division of FES is to coordinate and meet with program development committees appointed by the FES Administration, to review and revise 4-H project areas. One of the principle duties of these committees is to recommend and supervise the production of literature for their program. They are not necessarily charged with the actual production. Let me illustrate by what has happened in two recent program committees. Field Crop Science was sadly in need of a rejuvenation. A new sponsor had just been secured. Many state specialists were unhappy with the then present situation and had some literature prepared incorporating the scientific "why". In fact, much of this material was almost pure botony. A committee was requested and appointed. Included were State and Federal

---

1/ Presented by Kemp L. Swiney, Program Leader 4-H Division, FES, USDA, at the Southern Regional Livestock Specialists' Conference, Texas A&M University, College Station, Texas, November 11-15, 1968.

plant science people, 4-H workers, a representative of the sponsor, and an individual from the National 4-H Service Committee. This Committee quickly recognized that new literature was needed. Through financial help from the sponsor they were able to obtain the assistance of a retired State Extension agronomist who had worked very closely with 4-H and youth. He has undertaken the responsibility to gather together from the States all materials that may be useful in this plant science field and to incorporate them into a set of National manuals. He is working very closely with J. R. Paulling, Federal Extension Agronomist, myself, Ty Thompson of the National 4-H Service Committee, and Don Wildrick for the sponsor, AmChem.

Another situation which I inherited concerns many of you here. Administrator Davis some 12 to 15 months ago appointed an Ad Hoc Committee to develop a 4-H meat science program. Eugene Williams, State 4-H Leader of Oklahoma, was appointed chairman. Included were various Extension workers who were knowledgeable in meat science, nutrition, and youth work. This committee met, worked out an outline as to the content for the program, assignments were made and accepted. The committee met a few weeks ago to determine what progress had been made. It was determined that the prepared materials were much to complicated and involved for the age youngster intended. A Journalist was engaged (Mrs. Sherry Hansen, the Medical Journal, who edited the Vet Science literature) and she is rewriting and editing the materials.

These two circumstances illustrate two important aspects of literature development. The field crop people had an established program to begin with, whereas the meat science people had to start almost from scratch. They need recommendations as to other aspects of the program (judging, contests, etc.).

There are at least three possible avenues of approaches we should make when we discuss literature:

I. The content
II. The preparation process
III. The "packaging"

The literature should communicate information to and provide learning experiences for specific audiences. To be most effective, all literature must be easily understood by those to whom it is directed. Literature to be used by 4-H members should be written at their levels of Understanding and development.

Each project manual should include (1) "What" should be learned in the project; (2) "Why" it should be learned; and (3) suggestions as to "how" it might be learned. In addition to providing basic subject matter on a particular project, the literature should help the member relate this project to other projects and activities. For example, how is the beef project related to the pasture or entomology project? What are some topics for demonstrations in this project? Is judging a supplementary part of the project? Might an educational tour be a learning experience that would help to achieve the objectives of the project? If these are helpful items that will assist the youngster to learn about swine, and the other animals, then include them.

Are there areas in the field of animal science where a youngster can study and learn without owning an animal? Bob Pinches of our staff projects that by 1975, there will be 45,175,000 youngsters 9 to 19 years old (potential 4-H Club members) -- we hope to have 5 million 4-H'ers by then. Of this 45 million, Bob projects that

almost 12 million will be in central cities of 50,000 people or more, another 18 million will be in the urban fringe around these large cities. Three and three-fourths million will be in towns and cities of 10-50,000 people and 10 million will be in cities and towns under 10,000 people and in non-farm rural. Only 1-3/4 million of these 45 million will be on farms. We must have projects and materials available that will be attractive to these youngsters no matter where they live. A dairy committee is even considering proposing a dairy project in which a youngster borrows a cow. Or just studies milk. Can't you just see some of our old Extension dairy specialists and fair superintendents if they were told this. What is more important, having breeding association's papers made out in the youngster's name or creating a learning experience for that youngster? You know my position, but I am biased.

The content of the literature should be developed for a specific job and audience, and it must be tailored to the developmental ages of youngsters. Materials written at a level for a 9-12 year old will bore a 16 year old. What will challenge a 16 year old may not be understood by the 11 year old. Other youth organizations recognize this. Boy Scouts have Cubs, Scouts and Explorers; Girl Scouts have Brownies, Intermediate Scouts and Senior Scouts--

Educators have studied youngsters and have made recommendations that we can use. I will not go into detail. If you are planning literature, talk to your 4-H staff about these development ages--but we are recommending three age grades:

9 - 12 year olds	- Juniors
12 - 14	- Intermediate
14 & over	- Seniors

Many states have excellent outlines that will assist in literature preparation. Virginia, Texas to name two who are here today.

In tune with today's living. What was the "bee's ear" a few decades ago is now "cool" or "groovy" - what was considered high school level material 10 years ago, no, even 5 years ago, is now junior high staff. And some junior high courses today get into what was college material 20 years ago. My 13 year old last year in 7th grade had to be able to get the genotype and phenotype resulting from a F-2 cross involving horned and polled, black and white fact cattle. This year in math he will be studying measures of central tendency (statistic). They have to start earlier. This tremendous amount of knowledge which they must know is still growing. Are we helping them learn?

More "Why" than just "How"

Keeping in mind the great amount of knowledge now and the amount that must come later we must teach these youngsters how to learn and that it is a continuous job--one that is never finished. This can be the greatest assist from 4-H work, the task of learning to learn.

Records - Simpler

True, but they must also incorporate these learning experiences we are designing for the youngsters. If he needs to know the economics of cattle feeding, structure the record so it gives him the true picture. If he needs to know that certain characteristics are desirable in selecting breeding animals, structure the record so the youngster knows he has learned these characteristics. Program learning? May be the answer, but we don't have all the answers there either.

Leaders Manuals or Guides

We are now recommending that leaders' materials be prepared with all 4-H member literature. Why? We will, if we are not already, be involving more and more people who are not authorities in the subject to guide these youngsters. Some of these leaders may be volunteers, some will be sub-professionals paid on a part-time basis. We must give them more than we give the youngster. In fact, you should probably start the leader material where you stop the member guide. Remember the professor who assumes you have read the text book before the first class period and starts on the last page and goes from there.

No, seriously, leaders' materials should cover more on how to work with youngster, their needs and interests. A listing of bulletins and materials that can be of assistance to leaders and members and some of the community resources that will be of assistance in conducting the project should be included. Visual means of teaching should be noted and made available. Content is important. You subject matter specialists are the ones who have to put this material in the publications.

The Process of Preparation

This is a problem for many of our specialists. It was one that I detested, but it can be done if you set your mind to it and involve others on the Extension staff, that is, the 4-H staff, the editorial staff, etc.

Some of the Things We Suggest In Regard to Literature Development

1. National development committees.
2. Joint authorship, maybe even a department effort.
3. Agents and/or leaders and members involved in planning, testing, and reworking literature.
4. Bring in the editorial staff early in the preparation process--this is a burden for some people. Alabama has a 4-H editor. This may be the way to go.
5. More sharing among States.

Dixon Hubbard proposes that regions be responsible for literature development

Northeast Region - horse
Western Region - sheep
North Central Region - swine
Southern Region - beef cattle

Give it some consideration. Committees could be formed.

The Packaging

1. Each State usually has its own package to put literature in.

   a. Color coded covers of a standard design
   b. Size and style of the publication
   c. Records included or in certain places

2. Project plan should be clearly stated. Youngster should know the requirements. Activities that should be included.
3. Readability. (Pick up a school book written for the age group you are writing

for, study it. Are you writing at the correct level?)
4. Use of artist and layout to achieve the visual effect you desire.

Summary

1. Content. Important you have it. Many of you know how to say it, but you don't have the time to prepare six pieces of literature on swine, beef cattle, horses sheep. That's 24 right there, and you would probably want to break each specie down into feeding, breeding, etc. So you see it gets to be a major effort for a department to prepare literature and this literature must be revised, etc. Joint efforts are the answer.
2. Preparation. Why duplicate effort. Yes, I know the old saying, "publish or perish," but let's spread the responsibility around and make the job easier for all.
3. Packaging. Use everyone you can-the members even have some suggestions we might use.